ACCESSION NR: AP4022663

on a charge 10 mm in diameter encased in an inert coat of cement-phosphate or glass. It was observed that low values of relative density δ diminished the combustion rate, the combustion even becoming incomplete at $\delta = 0.75$-0.65. In order to assess the role of heat loss, the second series of experiments was carried out in plexiglass containers with a 6-mm internal diameter. The result showed that with a lower δ the combustion rate was increased. In the third series of experiments, 2% hexamethylenetetramine were added to the ammonium perchlorate in a plexiglass casing. It was found that here a lowering of δ caused even a slight increase in the combustion rate. In the fourth series, 2% Cu_2O was added as a catalyst, which accelerated the reaction rate and reduced the zonal width of the reaction. The fifth series was conducted with pure ammonium perchlorate at a higher initial temperature. This caused the combustion rate to increase. The incorporation of small amounts of asphalt had an inhibitory effect on the combustion rate, while larger quantities enhanced it. Orig. art. has: 5 tables.

ASSOCIATION: none

SUBMITTED: 30Jul63 DATE ACQ: 08Apr64 ENCL: 00

SUB CODE: MA NO REF SOV: 000 OTHER: 002

Card 2/2

ACCESSION NR: AP4022663 S/0207/64/000/001/0131/0134

AUTHORS: Bakhman, N. N. (Moscow); Belyayev, A. F. (Moscow); Lukashenya, G. V. (Moscow); Polikarpov, D. P. (Moscow)

TITLE: The relation between the combustion rate of ammonia perchlorate and its density

SOURCE: Zhurnal priklad. mekhan. i tekhn. fiz., no. 1, 1964, 131-134

TOPIC TAGS: combustion, combustion rate, casing, combustion heat, heat loss, condensed system, gas phase, solid phase, particle size, chamber pressure, porosity, density, relative density

ABSTRACT: The combustion rate (u cm/sec) of compacted systems depends on the relative density δ of the sample where δ is equal to the ρ/ρ_{max} ratio. Here ρ gm/cm^3 represents the actual and ρ_{max} the potentially possible density of the given sample. The shape of the u curve depends, in turn, upon the conditions under which the reaction takes place and on the existing heat losses. The present investigation was performed on compacted ammonium perchlorate in a constant pressure tank in an atmosphere of nitrogen. The first series of tests was conducted

Card 1/2

BELYAYEV, A.F. (Moskva); KOROTKOV, A.I. (Moskva); SULIMOV, A.A. (Moskva)

Effect of pressure on disturbances of the combustion stability of porous explosives. PMTF no.5:117-120 S-O '63. (MIRA 16:11)

1. Institut khimicheskoy fiziki AN SSSR.

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R000204600043-6

BELYAYEV, A.F.; KOROTKOV, A.I.; PARFENOV, A.K.; SULIMOV, A.A.

Burning velocity of some explosives and mixtures at considerably increased pressures. Zhur.fiz.khim. 37 no.1:150-156 Ja '63. (MIRA 17:3)

1. Institut khimicheskoy fiziki AN SSSR.

ANDREYEV, K.K., prof., red.; BELYAYEV, A.F., prof., red.; GOL'DINBERG, A.I., prof., red.; GORST, A.G., prof., red.; YAKIMOV, S.Ya., inzh., red.; STEPANOVA, A.A., red. izd-va; NOVIK, A.Ya., tekhn. red.

[Theory of explosives]Teoriia vzryvchatykh veshchestv; sbornik statei. Moskva, Oborongiz, 1963. 578 p. (MIRA 16:4)
(Explosives)

Pressure dependence of the ...

nitroglycol ($T_{eff} \simeq 1400^{\circ}K$), fulminating mercury ($T_{eff} \simeq 1100^{\circ}K$), and trotyl ($T_{eff} \simeq 2200^{\circ}K$). There is 1 figure.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics of the Academy of Sciences USSR)

PRESENTED: August 3, 1962, by V. N. Kondrat'yev, Academician

SUBMITTED: July 30, 1962

Card 3/3

$\alpha = 1.5 \cdot 10^{-3}$ deg^{-1} at p = 1 atm and $\alpha = 1.4 \cdot 10^{-3}$ deg^{-1} at p = 22.5 atm, i.e. α and the combustion heat remain constant in this pressure interval. This analogous behavior of α and the combustion heat is in line with the theory of Ya. B. Zel'dovich (ZhETF, 12, 498 (1942)) according to which $\alpha \simeq E/2R\ T_{max}^2$ can be derived where T_{max} is the maximum combustion temperature and E the activation energy. It is assumed that the combustion temperatures increase by the same amount as the initial temperatures: $(T_{max})_2 = (T_{max})_1 + \Delta T$. In this relation T_{max} must be replaced by an effective temperature $T_{eff}\ T_{max}$ since the main reaction in the combustion often proceeds at a temperature lower than T_{max}. The measurement of α and E permits the calculation of T_{eff}. With E = 30,000 cal/mol and $\alpha = 1.4 \cdot 10^{-3}$ deg^{-1}, $T_{eff} \simeq 2300^{\circ}$K was obtained for the mixture of potassium perchlorate and bitumen. This value is close to that of T_{max} known from other measurements. T_{eff} is calculated and discussed for

S/020/63/148/006/018/023
B192/B102

AUTHORS: Belyayev, A. F. Lukashenya, G. V.

TITLE: Pressure dependence of the temperature coefficient of the combustion rate of explosives and powders

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 148, no. 6, 1963, 1327-1330

TEXT: A study of the temperature coefficient α of the combustion rate supplies data on the combustion mechanism in explosives and powders. If u_1 is the combustion rate at the initial temperature T_o; u_2 that at $T_o + \Delta T$, then

$$\alpha = \frac{\ln(u_2/u_1)}{\Delta T} \text{ deg}^{-1} .$$

For a mixture of 87% potassium perchlorate and 13% bitumen α was measured at initial temperatures between -50° and +80°. The measurement values of ln u plotted versus T_o fit well on a straight line.

Card 1/3

BELYAYEV, A.F.; TSYGANOV, S.A.

Burning of condensed mixtures with nonvolatile and undecomposable combustibles under elevated pressure. Dokl. AN SSSR 146 no.2:383-386 S '62. (MIRA 15:9)

1. Institut khimicheskoy fiziki AN SSSR. Predstavlenc akademikom V.N. Kondrat'yevym.
(Combustion)

recording the pressure rise in the bomb on ignition of the powder. The relation $u = 1/t$ was calculated from 1. At 1 atm, $\alpha_{DRP-3} \cong 1.4 \cdot 10^{-3}$ deg^{-1}, and $\alpha_{BM} \cong 5 \cdot 10^{-3}$ deg^{-1}; at 10 atm, $\alpha_{DRP-3} \cong 2.8 \cdot 10^{-3}$ deg^{-1}, and $\alpha_{BM} \cong 3.1 \cdot 10^{-3}$ deg^{-1}. The lower values of α_{DRP} are attributed to the constant contribution u^* of the added sulfur to the rate of combustion, resulting in a decrease of the temperature dependence of u: $\alpha = \ln\left[(u_t' - u^*)/u_o\right]/(t - t_o)$. As $u_{BM} \approx 0.2$ cm/sec and $u_{DRP} \approx 0.8$ cm/sec, it follows that $u^* = 0.6$ cm/sec. As a general rule, systems containing an "accelerating" admixture possess a high value of u but a lower value of α. This means that u is less dependent on the initial pressure and temperature. There are 2 figures.

ASSOCIATION: Akademiya nauk SSSR, Institut khimicheskoy fiziki (Academy of Sciences USSR, Institute of Chemical Physics)

SUBMITTED: April 24, 1961

X

37634
S/076/62/036/005/009/013
B101/B110

11.2120

AUTHORS: Belyayev, A. F., and Lukashenya, G. V.

TITLE: The temperature coefficient of the combustion rate of black powder

PERIODICAL: Zhurnal fizicheskoy khimii, v. 36, no. 5, 1962, 1050-1053

TEXT: The temperature dependence of the combustion rate, u, of ДРП-3 (DRP-3) black powder (approximate composition 15% charcoal, 75% KNO_3, and 10% S) and of a binary mixture (BM) of charcoal (15%) with KNO_3 (85%) was studied. This is defined as $\bar{\alpha} = (1/\bar{u}_{1,2})(u_2 - u_1)/(t_2 - t_1)$, where u_1 and u_2 are the combustion rate at the temperatures t_1 and t_2, respectively; $\bar{u}_{1,2}$ is the average rate of combustion in the temperature interval of $t_2 - t_1$. The experiments were made with cylindrical specimens (diameter, 6 mm; length l, 6 - 7 mm; $\varrho_{BM} \sim 1.7$ g/cm^3; $\varrho_{DRP-3} \simeq 1.75$ g/cm^3). α was determined in the temperature range of 20-250°C at 1 and 10 atm by

Card 1/2

BELYAYEV, A.F.

Heavy hail shower in Rostov-on-Don. Meteor. i gidrol. no.1:40 Ja '62. (MIRA 15:1)

(Rostov-on-Don--Hail)

BELYAYEV, A.F.

Relaxation mechanism of combustion propagation in heterogeneous exothermal systems. Zhur.fiz.khim. 35 no.6:1374-1378 Je '61.
(MIRA 14:7)

1. Akademiya nauk SSSR, Institut khimicheskoy fiziki.
(Combustion)

82522

The Effect of Particle Size Upon the Combustion Rate of Mixtures Containing $KClO_4$ as the Basic Ingredient

S/020/60/133/04/24/031
B004/B056

at all ($d \leq d_{min}$) or is only very little influenced by d (Large d). The authors compare these results with those in the papers by O. I. Leypunskiy (Ref. 1) and B. V. Novozhilov (Ref. 3), in which a dependence $u \sim 1/d$ was reported to exist. As in these papers experiments were carried out with non-gasifying fuel, the authors carried out additional experiments with two mixtures of KNO_3 and charcoal, where in one mixture d was $\sim 10 - 20\mu$, and in the other d was $\sim 400\mu$. Also in these experiments only a slight dependence of u on d was observed. The papers of Refs. 1, 3, thus, do not agree with the experimental data, and the theoretical model of the combustion of mixtures must be thoroughly revised. There are 2 figures and 3 Soviet references.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics of the Academy of Sciences USSR)

PRESENTED: March 12, 1960 by V. N. Kondrat'yev, Academician

SUBMITTED: March 10, 1960

Card 3/3

82522

The Effect of Particle Size Upon the Combustion Rate of Mixtures Containing $KClO_4$ as the Basic Ingredient

S/020/60/133/04/24/031
B004/B056

as a fraction (d = 0.01 mm) crushed by means of a vibration mill were used. The organic fuel was diluted with a solvent, mixed with $KClO_4$, dried, and pressed to a relative density of 0.98 - 1.00 (in the case of plexiglas, 0.90). The combustion rate was photographically recorded in a nitrogen atmosphere at pressures of $0 \leq p \leq 125$ atm. In the present paper, the authors investigated only the state of the uniform combustion in layers. Fig. 1 shows the function u(p) for a stoichiometric mixture of $KClO_4$ with bitumen for various particle sizes of $KClO_4$. Fig. 2 shows the function u(d) for p = 1, 3, 5, and 10 atm. For small particle sizes ($d \leq d_{min}$), u no longer depends on d. The following is derived for d_{min} from the equality of the mixing zone l_{mix} of the vapors with the heating zone l_{heat} of the vapors ($l_{mix} \sim l_{heat}$): $l_{mix} \sim ud^2$ and $d_{min} \sim 1/u$ (2). For each pressure there exists a certain range of d in which u depends in a high degree on d, whereas outside this range, u either does not depend on d

Card 2/3

82522

S/020/60/133/04/24/031
B004/B056

11.8000

AUTHORS: Bakhman, N. N., Belyayev, A. F.

TITLE: The Effect of Particle Size Upon the Combustion Rate of Mixtures Containing $KClO_4$ as the Basic Ingredient

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 133, No. 4, pp. 866 - 868

TEXT: The authors describe preliminary results of their attempts to derive a relation between the combustion rate u and the degree of heterogeneity of solid heterogeneous mixtures. For the case in which one of the two components of the mixture consists of a small fraction of particles of an average size d, whereas the second component is plastic and consists of particles which are considerably smaller than d, or pass more easily into the gaseous phase than the first component does, the degree of heterogeneity is determined only by d. The function u(d) was studied in mixtures of crystalline $KClO_4$ with bitumen, "goudron", or plexiglas. Of $KClO_4$ three sieved-out fractions with d = 1.7, 0.2, and 0.07 mm, as well

Card 1/3

Dependence of the Rate of Burning of Smoke-forming Powder on Pressure

S/020/60/131/04/047/073
B011/B017

Hence the experiments to apply the same dependence to several systems in a wide pressure range are principally incorrect. K. K. Andreyev is mentioned. There are 2 figures and 5 Soviet references.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR
(Institute of Chemical Physics of the Academy of Sciences, USSR)

PRESENTED: November 12, 1959, by N. N. Semenov, Academician

SUBMITTED: November 12, 1959

Card 3/3

powder 2, $u = 0.9 + 0.19\,p^{0.5}$ (2); powder 3, $u = 1.5 + 0.2\,p^{0.47}$ (3). The dependences (1) - (3) are shown in figure 1. The experimentally determined points fit well to the curves which correspond to the rules assumed by the authors. For $p < 5$ ata, dependence (1) holds for powder 1, for powder 3 (and approximately for powder 2), however, the formula $u = 0.88\,p^{0.5}$ (3a) holds (Fig 2). It can be seen that for $p \simeq 5$ata the curve of powder 3 (and that of powder 2) shows a break (transition from curve 3a to curve 3). The authors state that ν was practically equal and ~ 0.5 for powders 1 - 3. From a comparison of the coefficients b in powders with and without sulfur, the authors draw the conclusion that sulfur leads to an additional rapid reaction which considerably increases the rate of burning for $p < 5$ ata. Above $p > 5$ ata, the rate of burning with and without sulfur increases due to the same rule. The authors assume that when 5 ata are attained no further acceleration due to sulfur occurs but the acceleration already attained is maintained. This is expressed by the fact that a constant summand A is found in the dependence u on p. In any case, the experimental results with smoke-forming powder must be taken into account in investigating the dependence mentioned in the title of high-efficiency types of mixed powders. As is shown above, the character of u(p) can be considerably changed by pressure.

AUTHORS: Belyayev, A. F., Maznev, S. F.

S/020/60/131/04/047/073
B011/B017

TITLE: Dependence of the Rate of Burning of Smoke-forming Powder on Pressure

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol 131, Nr 4, pp 887-889 (USSR)

TEXT: The authors determined the dependence mentioned in the title of the following mixtures: 1) 15% of charcoal, 85% of KNO_3 (gunpowder without sulfur); 2) smoke-forming gunpowder of own production (ordinary composition); 3) industrially produced smoke-forming gunpowder. Cylinders pressed at 4,000 atm, of a diameter of 3-6 mm, and a density of 1.75 g/cm^3 were burned in nitrogen in a closed tank or under a bell glass at 0.1 to 125 absolute atmospheres (ata). The rate of burning was determined optically (photographic recording) and electrically by means of an oscilloscope. The formula: $u = A + bp^{\nu}$ is used to calculate the dependence mentioned in the title where u (cm/sec) denotes the velocity of flame propagation; p(ata) the absolute pressure at which gunpowder is burning; ν, b and A constants (for the respective gunpowder). With $p \simeq 5$ ata, the character of the curve u(p) changes; for this reason, the authors discuss the dependence in the range $p = 5 - 125$ ata and $p < 5$ ata, separately. For $p > 5$ ata, the following results were obtained: powder 1, $u = 0.195\ p^{0.5}$ (1);

Card 1/3

The Effect of the Initial Temperature on the Value of the Critical Diameter of Nitroglycerin and Trotyl

is better. If one assumes that the two explosives explode in consequence of a heat evolution occurring on their compression, and of a subsequent homogeneous gas reaction, then the initial temperature of the chemical reaction, i.e. the temperature which causes a shock wave, will have to be in the range of 1100-1200°K. In connection with the evaluation of the experimental data, to which the major part of the paper is devoted, A. I. Serbinov (Ref 4) and S. B. Ratner (Ref 7) are mentioned. There are 4 figures, 4 tables, and 8 references, 6 of which are Soviet.

ASSOCIATION: Akademiya nauk SSSR, Institut khimicheskoy fiziki (Academy of Sciences of the USSR, Institute of Chemical Physics)

SUBMITTED: June 14, 1958

Card 3/3

The Effect of the Initial Temperature on the Value of the Critical Diameter of Nitroglycerin and Trotyl

of the nitroglycerin charges. Figures 1 and 2 show graphically the results obtained for the two explosives investigated. From these curves the values for the critical diameters of the two explosives at different initial temperatures were calculated (Tables 1,2). The initial temperatures of nitroglycerin were between -20 and +70°C, of trotyl between +81° (melting point of trotyl) and +240°C. The value of the critical diameter decreases rapidly with increasing initial temperature in both cases. The authors found for the critical diameter of liquid trotyl at 100°C a considerably higher value than A. Ya. Apin and V. K. Bobolev (Ref 3). Table 3 presents the detonation velocity of liquid trotyl near the critical diameter at 3 different initial temperatures, table 4 the values of the critical diameter of powdered trotyl at 3 different initial temperatures. The mechanism of the chemical reaction in powdered trotyl obviously differs from that in liquid trotyl. The critical diameter of liquid trotyl near its melting point is about the 30-fold of the critical diameter of nitroglycerin at room temperature; accordingly, the explosive properties of both explosives are quite different. Near the flash point of liquid trotyl ($\sim$ 240°C) the value of the critical diameter is only the threefold of the value for nitroglycerin at room temperature. In this case the agreement of the explosive properties of both explosives (detonation capacity, sensitivity, etc.)

2.1000

69137

AUTHORS: Belyayev, A. F., Kurbangalina, R. Kh. (Moscow)

S/076/60/034/03/017/038
B115/B016

TITLE: The Effect of the Initial Temperature on the Value of the Critical Diameter of Nitroglycerin and Trotyl

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol 34, Nr 3, pp 603 - 610 (USSR)

TEXT: The critical diameter of an explosive charge is the minimum diameter at which a continuous propagation of the detonation wave is still possible. If the diameter of the charge is smaller than the critical one, the detonation dies. The physical importance of the critical diameter was clarified by Yu. B. Khariton, Academician, in reference 1. According to this author the value of the critical diameter is proportional to the time of the chemical reaction on the front of the detonation wave. The authors of the present paper investigated the effect of the initial temperature on the value of the critical diameter of liquid nitroglycerin, and liquid and powdered trotyl. In a detailed experimental part the performance of these investigations is described separately for both explosives. In trotyl, propagation and dying out of the detonation were checked by means of a mirror photorecorder of the type SFR-2M for velocities. The standard electrical detonator Nr 8 was used for ignition

4

BELYAYEV, A.F., doktor fiziko-matematicheskikh nauk, prof.; AZBUKINA, L.I.

Effect of the properties of a charge of explosive on the destruction of blocks of cement mortar. Vzryv. rab. no.4:6-17 '60. (MIRA 15:1)

1. Institut khimicheskoy fiziki AN SSSR.
(Explosives)

BELYAYEV, A.F.; KURBANGALINA, R.Kh. (Moskva)

Determination of the relative power output of explosives by the method of equivalent charges according to the expansion rate of Trautzl's bomb. PMTF no.2:116-119 Jl-Ag 60. (MIRA 14:6)
(Explosives--Testing)

BELYAYEV, A.F. (Moskva); SADOVSKIY, M.A. (Moskva); TAMM, I.I. (Moskva)

Application of the law of similarity to the phenomenon of transmitted detonation in blasts. PMTF no.1:3-17 My-Je '60. (MIRA 14:8)

1. Institut khimicheskoy fiziki AN SSSR.
(Blasting)

and the physicochemical properties of explosives essential for their production. The various applications of explosives are outlined. The appendixes contain data on the combustion range of gases and vapors mixed with air and with oxygen; sensitivity of explosives to shock; oxygen balance of explosives and ingredients of explosive mixtures; heats of formation of explosives, initial materials, ingredients of explosive mixtures, and explosion products; heats of combustion of nitro compounds; equilibrium constants; change in the internal energy of gases, graphite, and solid ingredients of explosion products; molar volumes of solid inorganic substances found in explosion products; values of second virial coefficients of gaseous explosion products at high temperature; and test methods and apparatus for explosives according to the State All-Union Standard Specifications. The authors thank D. S. Avanesov, A. Ya. Apin, A. I. Gol'binder, L. V. Dubnov, A. A. Zaytsev, A. M. Lomova, K. K. Snitko, I. V. Tishunin, and N. A. Kholevo. There are 25 references: 21 Soviet and 4 English.

BELYAYEV, A.F

PHASE I BOOK EXPLOITATION SOV/5150

Andreyev, Konstantin Konstantinovich, and Aleksandr Fedorovich Belyayev

Teoriya vzryvchatykh veshchestv (Theory of Explosive Materials) Moscow, Oborongiz, 1960. 595 p. Errata slip inserted. 9,000 copies printed.

Reviewers: K. K. Snitko, Doctor of Technical Sciences, Professor, and D. S. Avanesov, Candidate of Chemical Sciences, Docent; Ed.: A. I. Gol'binder, Doctor of Technical Sciences; Ed. of Publishing House: G. F. Loseva; Tech. Ed.: L. A. Garnukhina; Managing Ed.: S. D. Krasil'nikov, Engineer.

PURPOSE: This textbook is intended for students in chemical technology schools of higher education and in military academies. It may also be used by personnel of plants and scientific research institutes.

COVERAGE: The textbook covers the theory of explosives, describing slow thermal conversion, combustion, the detonation of explosives,

Card ~~1/16~~

SADOVSKIY, M.A.; BELYAYEV, A.F., prof., doktor fiz.-mat.nauk

Rock-breaking power of explosives. Ugol' 34 no.2:60-62 F '59.
(MIRA 12:4)

1. Institut khimicheskoy fiziki AN SSSR. 2. Chlen- korrespondent AN SSSR (for Sadovskiy).

(Explosives)

BELYAYEV, A.F.

AUTHOR: Solomonov, M. SOV/24-58-5-30/31

TITLE: Scientific-Method Conference on the Problem of Breaking-up Rocks by Explosions (Pervoye nauchno-metodicheskoye soveshchaniye po probleme drobleniya gornykh porod vzryvom)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1958, Nr 5, pp 143-144 (USSR)

ABSTRACT: On February 24-26, 1958 a conference was held on breaking-up rocks by explosions at the Institute of Mining, Ac.Sc., USSR (Institut Gornogo Dela AN SSSR). 100 people from 32 towns participated and the participants included representatives of Works, Research Institutes of the Ac.Sc. from various parts of the Soviet Union, departmental research institutes and of higher teaching establishments. On general theoretical problems the following papers were presented:
"On the problem of breaking-up rocks by explosions, present state and tasks" by L. I. Baron, Institute of Mining, Ac.Sc., USSR;
"On the dependence of the breaking-up on the total energy of the explosion" by A. F. Belyayev, Institute of Chemical Physics, AS USSR.

Card 1/5

127-10-14-24

TITLE: Charge Calculation in Blasting for Rock Ejection (O raschete zaryadov pri vzryve na vybros)

by analysis of experimental blast operations made by the "Soyuzvzry'prom".

Four Slavic references are cited.

ASSOCIATION: Not indicated

PRESENTED BY:

SUBMITTED: No date indicated

AVAILABLE: At the Library of Congress.

Card 2/2

BELYAYEV, A.F.

SUBJECT: USSR/Mining

127-10-14/24

AUTHOR: Belyayev, A.F., Doctor of Physical-Mathematical Sciences

TITLE: Charge Calculation in Blasting for Rock Ejection (O raschete zaryadov pri vzryve na vybros)

PERIODICAL: Gornyy Zhurnal, 1957, #10, pp 61-62 (USSR)

ABSTRACT: The author criticizes the formulae by Boreskov and Pokrovskiy (1 - 3) used presently for calculating the amount of explosives in blasting operations for rock ejection. He points out that both of them become non-applicable under certain conditions.

He proposes a new formula which takes into account two factors:

1. The amount of work consumed directly, for ejection, which is proportional to the fourth power of the line of least resistance, and
2. The amount of work consumed by plastic deformations, internal friction, demolishing and loosening of the surrounding medium, generation of seismic oscillations, etc, which is proportional to the third power of the line of least resistance.

The formula proposed by the author agrees with data obtained

Card 1/2

BELYAYEV, A' F

N/5
652.4
.P5

Diody i Triody Krystaliczne (Crystal Diodes and Triodes, by) A. F. Bieliajew i W. N. Loginow. Warszawa, Panstwowe Wydawnictwa Techniczne, 1955.
63 p. Illus., Diagrs. (Biblioteka Radiomechanika)
Translated from the Russian; Kristallicheskiye Detektory i Usiliteli.

BELYAYEV,A.F.; LOGINOV,V.N.; NIKITIN,N.A., redaktor; LARIONOV,G.Ye., tekhnicheskiy redaktor

[Crystal detectors and amplifiers] Kristallicheskie detektory i usiliteli. Moskva, Gos.energ.izd-vo, 1951. 63 p. (MLRA 9:1)
(Crystal detectors)

CA

Effect of pressure on the burning velocity of thermites. A. F. Belyaev and L. D. Komkova (Inst. Phys. Chem., Acad. Sci., U.S.S.R., Moscow). *Zhur. Fiz. Khim.* 24, 1382-111 (1950). The effect of pressure on the burning rate of solids was used as a criterion for deciding whether the gas phase partakes or not in some rate-detg. step. The systems studied were (I) Cr_2O_3 + 2Al, (II) Fe_2O_3 + 2Al, (III) Cr_2O_3 + 3 Mg, (IV) 1.5 MnO_2 + 2 Al. Pressed cylinders (80) atm.) of the reactants were burned in a bomb under a N_2 pressure up to 100 atm. The linear reaction rate was registered photographically. Runs in an atm. of A show that formation of nitrides does not affect the rate. The observed rates were of the order of a few cm./sec. Expti. points were somewhat scattered; this may be due to the varying d. of the cylinders which were pressed without binders. For I the rate remains const. (approx. 0.25 cm./sec.) up to 100 atm. For II and IV, the rate first increases steply with pressure (from 1 to 3 cm./sec. between 1 and 40 atm.), then remains approx. const. (satn. effect) up to 100 atm. The rate does not obey a relation of the type $r = A + bp$, but the data are well-fitted by the expression $r = A + [a(p - 1)/1] + b(p - 1)$, where $A = 1.2$ (for II), the rate for $p = 1$, $a = 3.6$, $b = 0.033$. The second term has the form of the Langmuir isotherm with $(p - 1)$ instead of p, since measurements start at 1 atm. For III, the rate first increases with p then tends to decrease for $p > 40$ atm. The results suggest that (1) in the case of I the rate is entirely detd. by solid-phase processes, (2) in the case of II and IV, Al vapor is partially vaporized and adsorbed at the oxide surface, where it reacts. The effect of pressure is thus to regulate the adsorption of the metal vapor rather than to regulate the vaporization of the metal.

Michel Boudart

1951

BELYAYEV, A. F.

"The Problem of the Flash of Explosives and the Transition of Combustion into Detonation," Zhur. Prik. Khim., Vol. 23, No. 4, 1950, pp 432-439.

Inst. Chem. Phys., AS USSR

BELYAYEV, A. F.

USSR/Chemistry - Explosives
Chemistry - Combustion

Jan 1948

"Boiling Point and Heat of Evaporation of Some Secondary Explosives," A. F. Belyayev, Inst of Chem Phys, Acad Sci USSR, Moscow, 9 pp

"Zhur Fiz Khim" Vol XXII, No 1

Boiling point and heat of evaporation are two factors figuring prominently in the theories of combustion, spontaneous combustion, and transfer of combustion to explosion in those explosives that burn in their gaseous state. Boiling point of secondary explosives is not as intense as tempera-

[redacted] 65T9

USSR/Chemistry - Explosives (Contd) Jan 1948

tures present during combustion. Truton's theories can be applied to most cases of secondary explosives. Submitted 14 May 1947.

[redacted] 65T9

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R000204600043-6

BELYAEV, A. F.

FA 9T52

USSR/Explosions - Measurements
Explosions - Pressure

May 1947

"The Relationship Between the Pressure and the Speed of Burning of Explosives," A. F. Belyaev, A. E. Belyaeva, 3 pp

"Doklady Akademii Nauk SSSR" Vol LVI, No 5

Tables and graph of results.

9T52

BELYAYEV, A. F. and KHARITON, Yu. B.

Mbr., Institute Physical Chemistry, Acad. Sci. -1944-

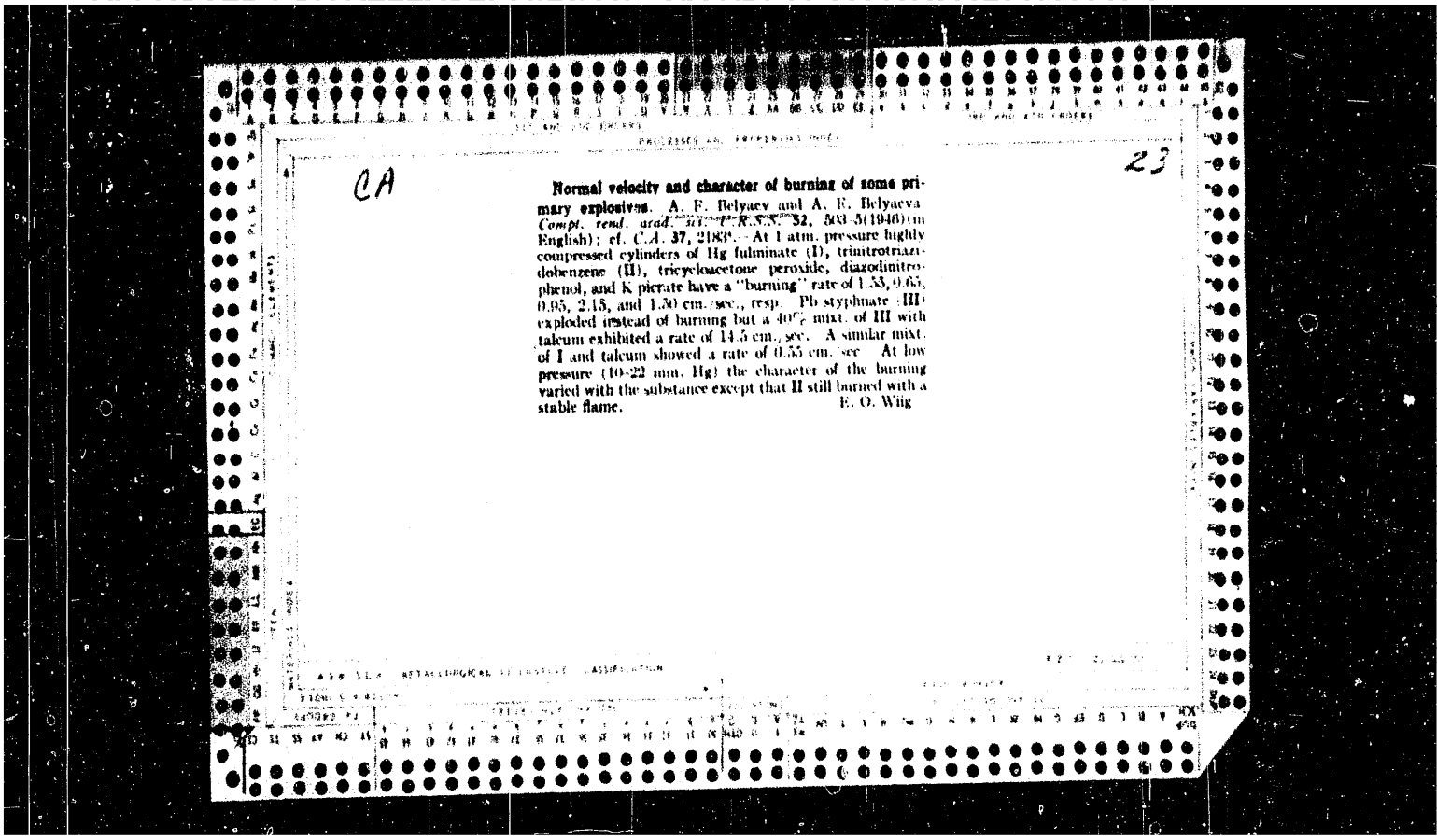
"The Limit Diameter of a Charge of Ammonium Nitrate," Dok. AN, 48, No. 4, 1947

BELYAYEV, A. F.

"Combustion Mechanism of Explosives." Sub 4 Feb 47, Inst of Physical Chemistry, Acad Sci USSR

Dissertations presented for degrees in science and engineering in Moscow in 1947

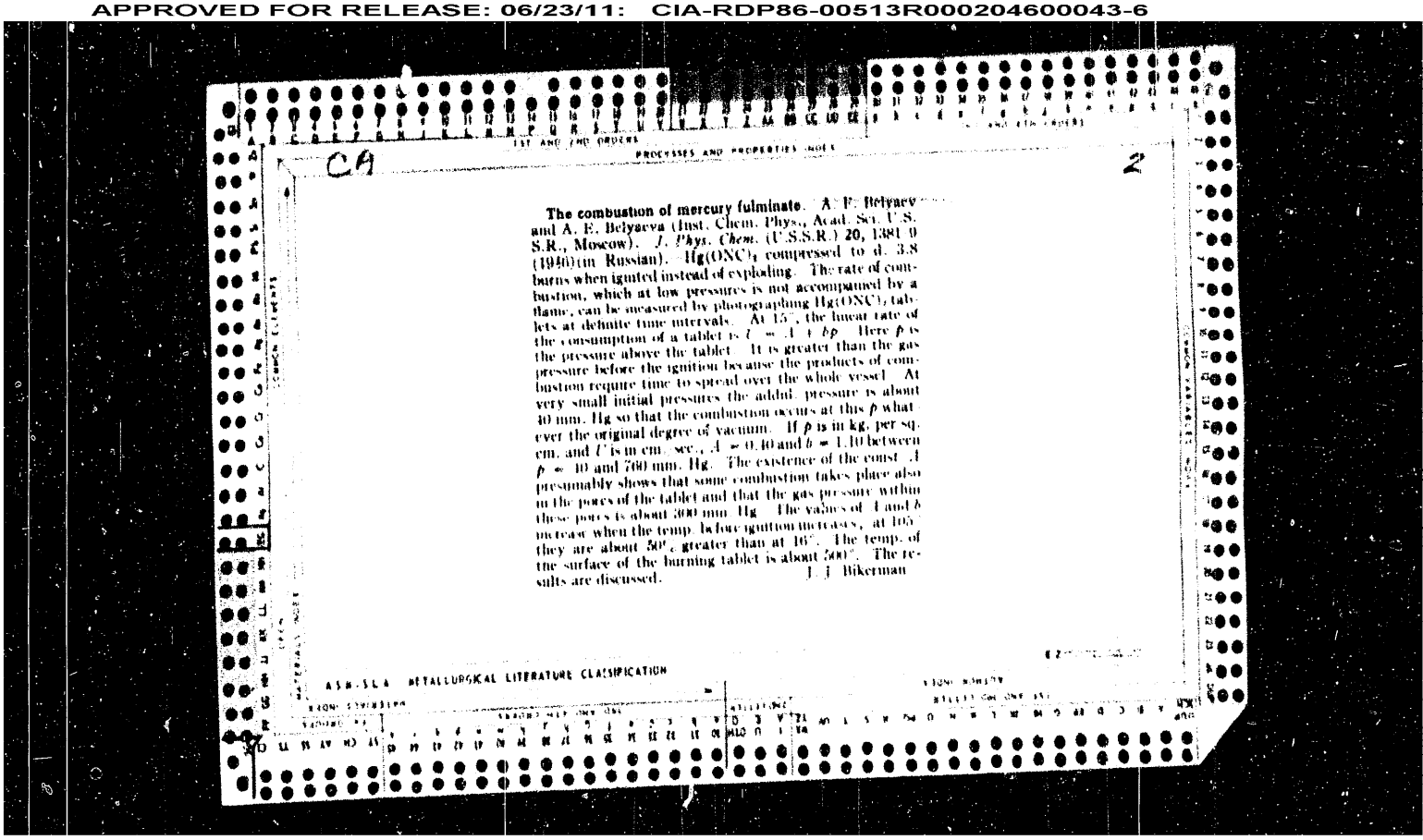
SO: Sum No. 457, 18 Apr 55



CA

23

Normal velocity and character of burning of some primary explosives. A. F. Belyaev and A. F. Belyaeva *Compt. rend. acad. sci. U.R.S.S.* **52**, 503-5(1946)(in English); cf. *C.A.* **37**, 2183⁸. At 1 atm. pressure highly compressed cylinders of Hg fulminate (I), trinitrotriazidobenzene (II), tricycloacetone peroxide, diazodinitrophenol, and K picrate have a "burning" rate of 1.53, 0.65, 0.95, 2.15, and 1.50 cm./sec., resp. Pb styphnate (III) exploded instead of burning but a 40% mixt. of III with talcum exhibited a rate of 14.5 cm./sec. A similar mixt. of I and talcum showed a rate of 0.55 cm./sec. At low pressure (10-22 mm. Hg) the character of the burning varied with the substance except that II still burned with a stable flame. E. O. Wiig



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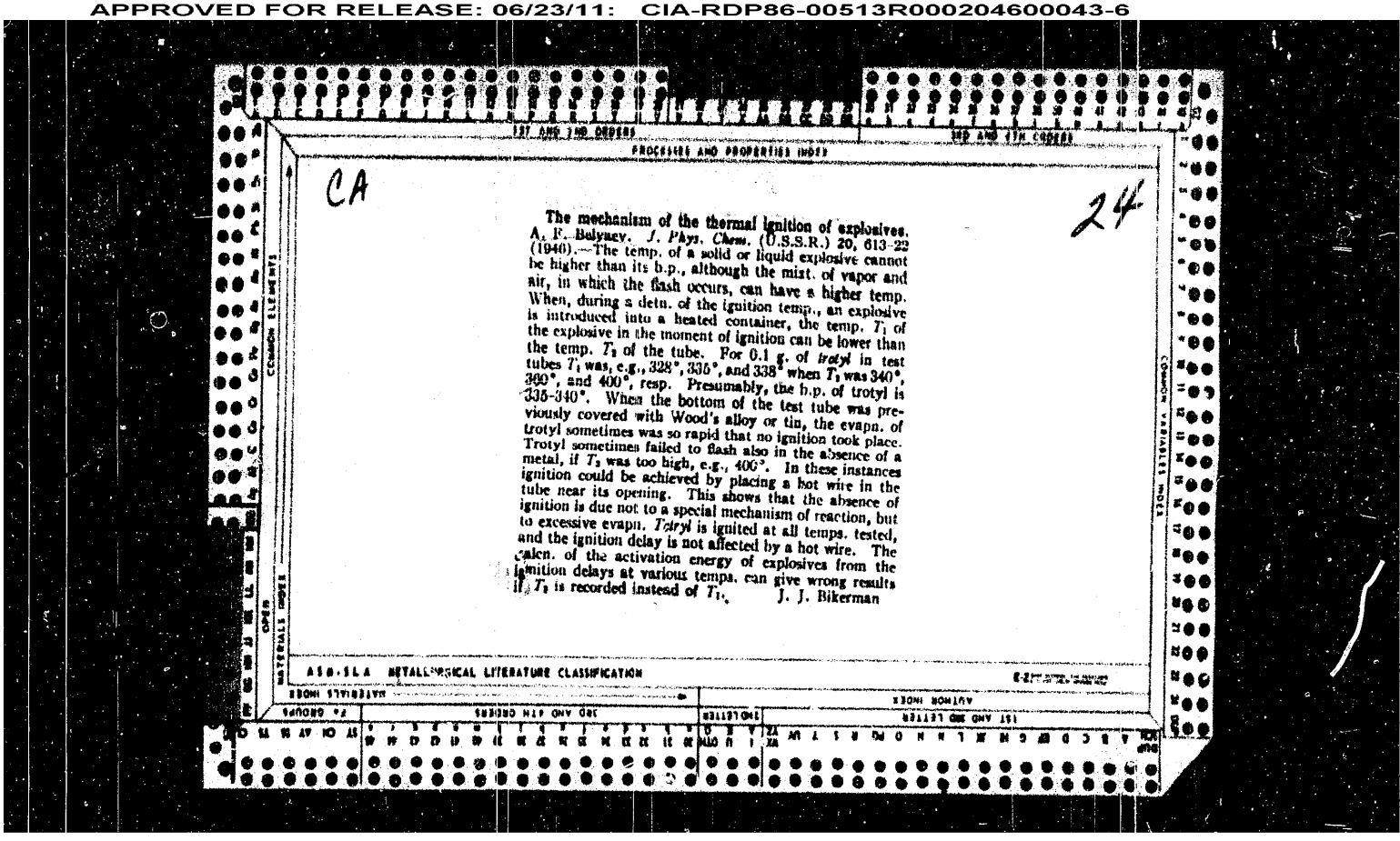
PROCESSES AND PROPERTIES INDEX

The combustion of mercury fulminate. A. F. Belyaev and A. E. Belyaeva (Inst. Chem. Phys., Acad. Sci. U.S.S.R., Moscow). *J. Phys. Chem.* (U.S.S.R.) **20**, 1381-9 (1946) (in Russian). $Hg(ONC)_2$ compressed to d. 3.8 burns when ignited instead of exploding. The rate of combustion, which at low pressures is not accompanied by a flame, can be measured by photographing $Hg(ONC)_2$ tablets at definite time intervals. At 15°, the linear rate of the consumption of a tablet is $U = A + bp$. Here p is the pressure above the tablet. It is greater than the gas pressure before the ignition because the products of combustion require time to spread over the whole vessel. At very small initial pressures the addnl. pressure is about 40 mm. Hg so that the combustion occurs at this p whatever the original degree of vacuum. If p is in kg. per sq. cm. and U is in cm. sec., $A = 0.40$ and $b = 1.10$ between $p = 10$ and 760 mm. Hg. The existence of the const. A presumably shows that some combustion takes place also in the pores of the tablet and that the gas pressure within these pores is about 300 mm. Hg. The values of A and b increase when the temp. before ignition increases, at 105° they are about 50° greater than at 16°. The temp. of the surface of the burning tablet is about 500°. The results are discussed. — I. J. Bikerman

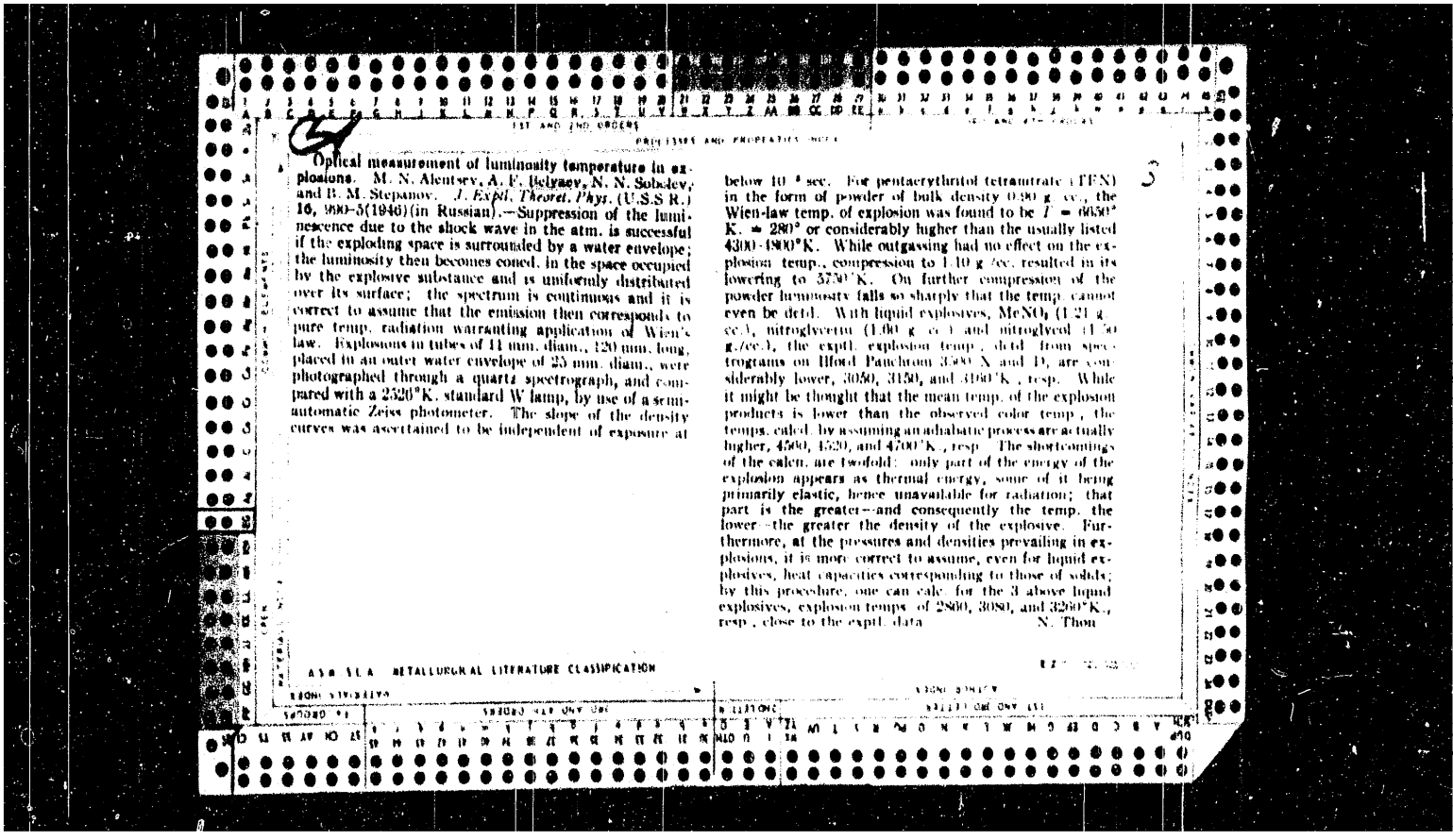
ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



CA

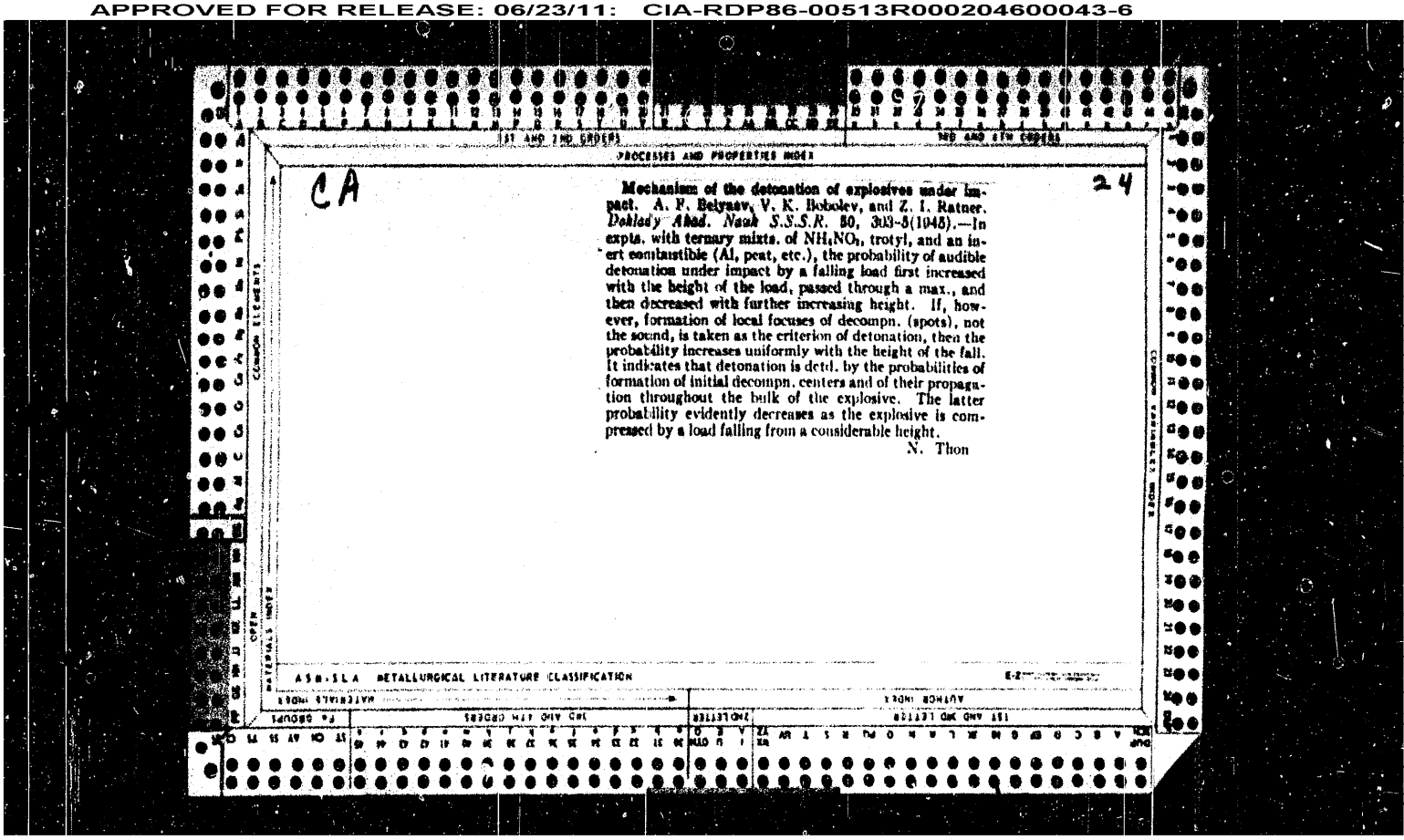
24

The mechanism of the thermal ignition of explosives. A. F. Belyaev. *J. Phys. Chem.* (U.S.S.R.) 20, 613–22 (1940).—The temp. of a solid or liquid explosive cannot be higher than its b.p., although the mixt. of vapor and air, in which the flash occurs, can have a higher temp. When, during a detn. of the ignition temp., an explosive is introduced into a heated container, the temp. T_1 of the explosive in the moment of ignition can be lower than the temp. T_2 of the tube. For 0.1 g. of *trotyl* in test tubes T_1 was, e.g., 328°, 335°, and 338° when T_2 was 340°, 360°, and 400°, resp. Presumably, the b.p. of trotyl is 335-340°. When the bottom of the test tube was previously covered with Wood's alloy or tin, the evapn. of trotyl sometimes was so rapid that no ignition took place. Trotyl sometimes failed to flash also in the absence of a metal, if T_2 was too high, e.g., 400°. In these instances ignition could be achieved by placing a hot wire in the tube near its opening. This shows that the absence of ignition is due not to a special mechanism of reaction, but to excessive evapn. *Tetryl* is ignited at all temps. tested, and the ignition delay is not affected by a hot wire. The calcn. of the activation energy of explosives from the ignition delays at various temps. can give wrong results if T_2 is recorded instead of T_1. J. J. Bikerman



Optical measurement of luminosity temperature in explosions. M. N. Alentsev, A. F. Belyaev, N. N. Sobolev, and B. M. Stepanov. *J. Expil. Theoret. Phys.* (U.S.S.R.) **16**, 980–5(1946)(in Russian).—Suppression of the luminescence due to the shock wave in the atm. is successful if the exploding space is surrounded by a water envelope; the luminosity then becomes coned. in the space occupied by the explosive substance and is uniformly distributed over its surface; the spectrum is continuous and it is correct to assume that the emission then corresponds to pure temp. radiation warranting application of Wien's law. Explosions in tubes of 11 mm. diam., 120 mm. long, placed in an outer water envelope of 25 mm. diam., were photographed through a quartz spectrograph, and compared with a 2520°K. standard W lamp, by use of a semi-automatic Zeiss photometer. The slope of the density curves was ascertained to be independent of exposure at below 10^{-4} sec. For pentaerythritol tetranitrate (PETN) in the form of powder of bulk density 0.80 g./cc., the Wien-law temp. of explosion was found to be $T = 6650°$ K. ± 280° or considerably higher than the usually listed 4300–4800°K. While outgassing had no effect on the explosion temp., compression to 1.10 g./cc. resulted in its lowering to 3730°K. On further compression of the powder luminosity falls so sharply that the temp. cannot even be detd. With liquid explosives, $MeNO_3$ (1.21 g./cc.), nitroglycerin (1.60 g./cc.) and nitroglycol (1.50 g./cc.), the expil. explosion temp., detd. from spectrograms on Ilford Panchrom 3500 Å and D, are considerably lower, 3050, 3130, and 3160°K., resp. While it might be thought that the mean temp. of the explosion products is lower than the observed color temp., the temps. calcd. by assuming an adiabatic process are actually higher, 4580, 4520, and 4700°K., resp. The shortcomings of the calcn. are twofold: only part of the energy of the explosion appears as thermal energy, some of it being primarily elastic, hence unavailable for radiation; that part is the greater—and consequently the temp. the lower—the greater the density of the explosive. Furthermore, at the pressures and densities prevailing in explosions, it is more correct to assume, even for liquid explosives, heat capacities corresponding to those of solids; by this procedure, one can calc. for the 3 above liquid explosives, explosion temps. of 2860, 3080, and 3260°K., resp., close to the expil. data. N. Thon

A 3 a 5 L a METALLURGICAL LITERATURE CLASSIFICATION



CA

24

Mechanism of the detonation of explosives under impact. A. F. Belyaev, V. K. Bobolev, and Z. I. Ratner. *Doklady Akad. Nauk S.S.S.R.* 80, 303-5(1948).—In expts. with ternary mixts. of NH_4NO_3, trotyl, and an inert combustible (Al, peat, etc.), the probability of audible detonation under impact by a falling load first increased with the height of the load, passed through a max., and then decreased with further increasing height. If, however, formation of local focuses of decompn. (spots), not the sound, is taken as the criterion of detonation, then the probability increases uniformly with the height of the fall. It indicates that detonation is detd. by the probabilities of formation of initial decompn. centers and of their propagation throughout the bulk of the explosive. The latter probability evidently decreases as the explosive is compressed by a load falling from a considerable height.

N. Thon

CA

24

Influence of the envelope of the charge on the stability of the detonation. A. F. Belyaev and A. E. Belyaeva. *Doklady Akad. Nauk S.S.S.R.* 50, 299–301 (1945).—

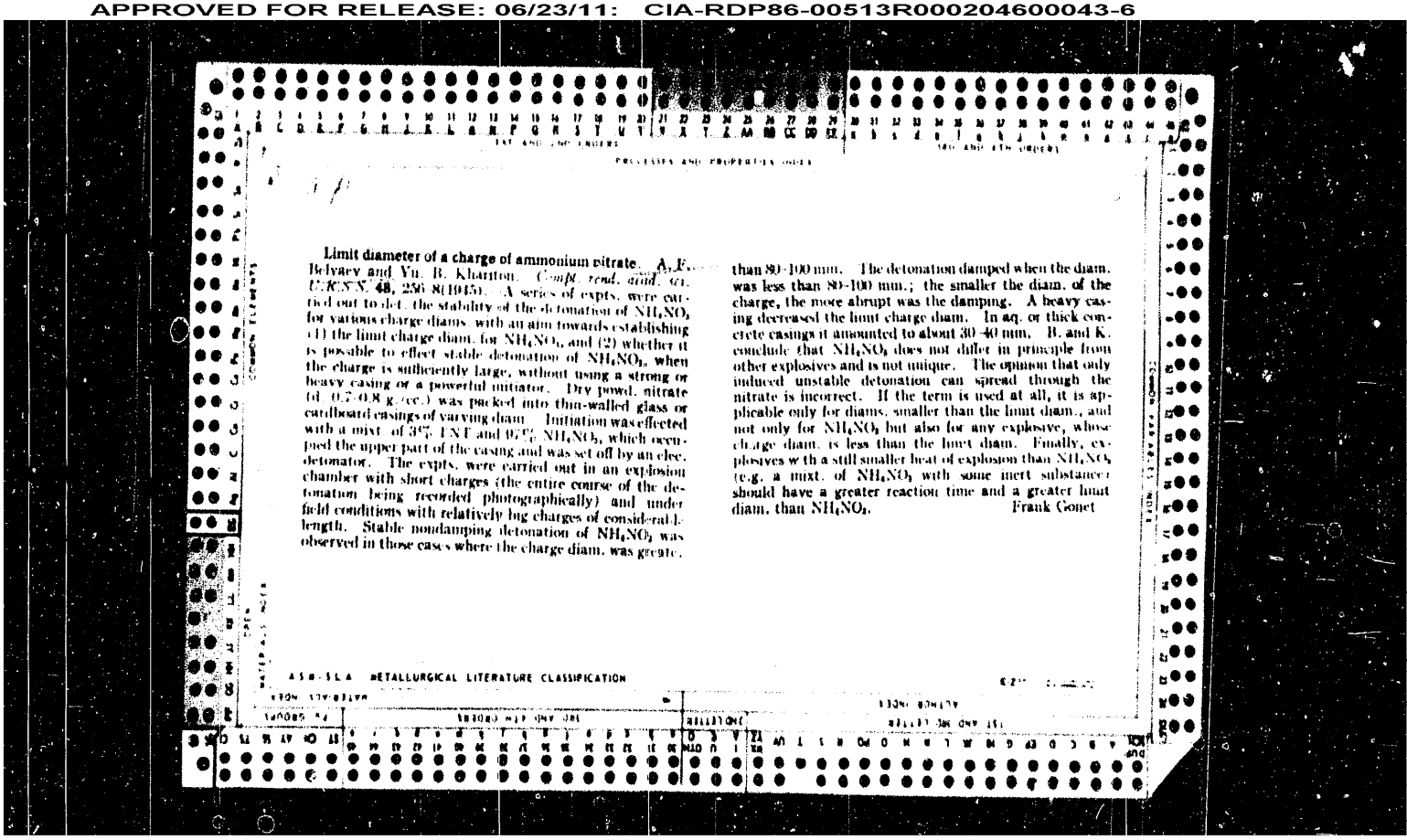
The stability (crit. point) of detonation of an explosive is approx. the same whatever may be the nature of the inert material composing the envelope (casing) of the charge, provided that the masses (weights) of the envelopes are the same; a casing of Fe having the same diam. and the same wall thickness as a casing of Pb has the weaker effect on the point of detonation and velocity of the explosion. The foregoing applies only to casings that are easily shattered, and not to massive walls of very strong materials, as steel. O. W. Willcox

CA

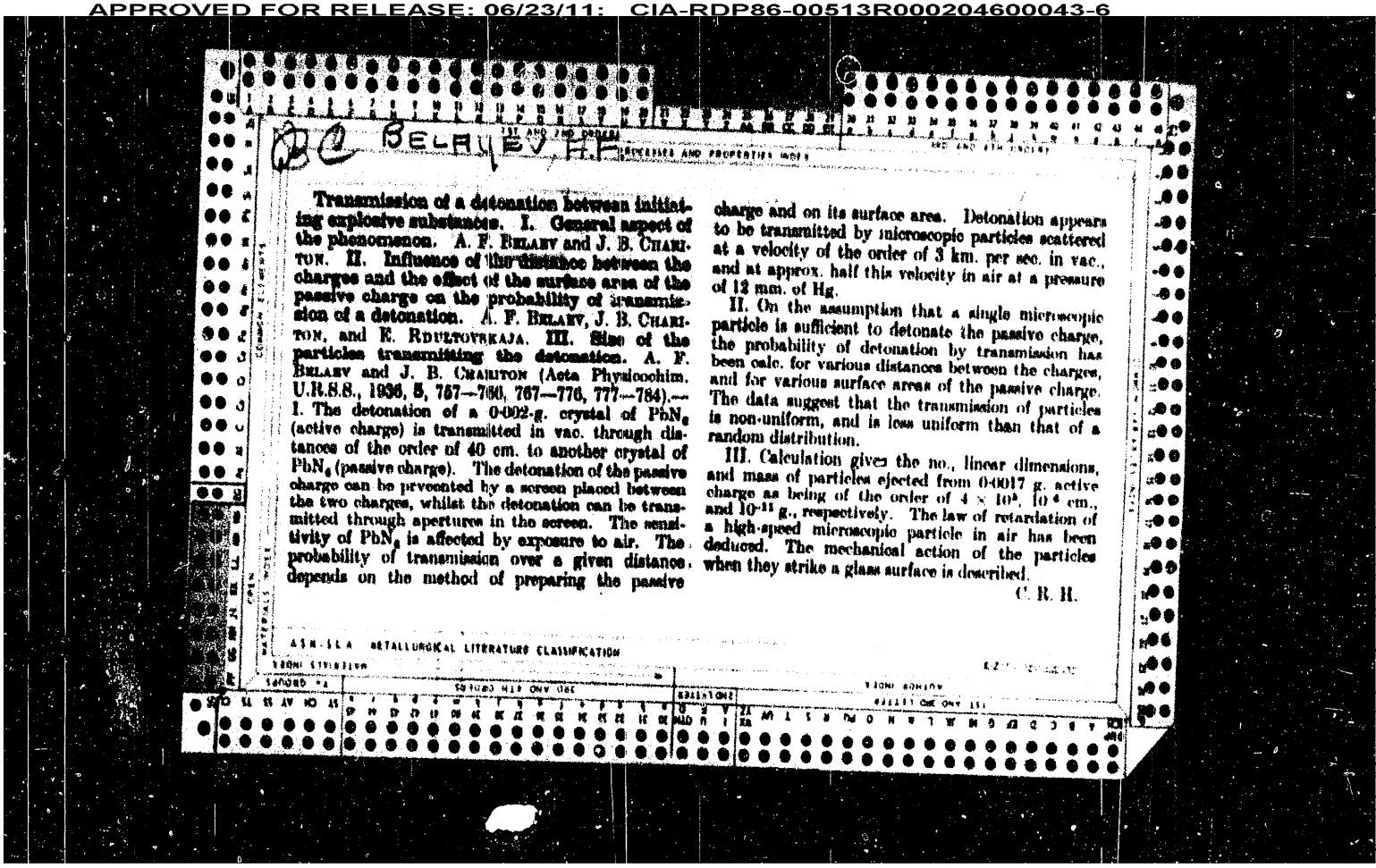
24

Relation between the limiting density of explosives and the diameter of the charge. A. F. Belyaev and A. E. Belyaeva. *Doklady Akad. Nauk S.S.S.R.* 30, 295–7 (1945).—Increasing the diam. of the charge from 11 to 62.5 mm. increased the crit. d. (of detonation) of mixts. of peat flour and NH_4NO_3 from 0.7 to 1.22, depending on fineness of grinding. The greater the proportion of peat and the coarser the grinding the lower is the crit. d. When in an 80:20 mixt. of trotyl and amatol a part of the trotyl was substituted by peat while the O balance was obtained, the heat effect changed little and the change in the relation between crit. d. and diam. was analogous to that in the preceding series. With increase of the percentage of trotyl the crit. d. increased rapidly with the diam.

O. W. Willcox



Limit diameter of a charge of ammonium nitrate. A. F. Belyaev and Yu. B. Khariton. *Compt. rend. acad. sci. U.R.S.S.* **48**, 256–8(1945). A series of expts. were carried out to det. the stability of the detonation of NH_4NO_3 for various charge diams. with an aim towards establishing (1) the limit charge diam. for NH_4NO_3, and (2) whether it is possible to effect stable detonation of NH_4NO_3, when the charge is sufficiently large, without using a strong or heavy casing or a powerful initiator. Dry powd. nitrate (of 0.7–0.8 g./cc.) was packed into thin-walled glass or cardboard casings of varying diam. Initiation was effected with a mixt. of 3% TNT and 97% NH_4NO_3, which occupied the upper part of the casing and was set off by an elec. detonator. The expts. were carried out in an explosion chamber with short charges (the entire course of the detonation being recorded photographically) and under field conditions with relatively lg charges of considerable length. Stable nondamping detonation of NH_4NO_3 was observed in those cases where the charge diam. was greater than 80–100 mm. The detonation damped when the diam. was less than 80–100 mm.; the smaller the diam. of the charge, the more abrupt was the damping. A heavy casing decreased the limit charge diam. In aq. or thick concrete casings it amounted to about 30–40 mm. B. and K. conclude that NH_4NO_3 does not differ in principle from other explosives and is not unique. The opinion that only induced unstable detonation can spread through the nitrate is incorrect. If the term is used at all, it is applicable only for diams. smaller than the limit diam., and not only for NH_4NO_3 but also for any explosive, whose charge diam. is less than the limit diam. Finally, explosives with a still smaller heat of explosion than NH_4NO_3 (e.g. a mixt. of NH_4NO_3 with some inert substance) should have a greater reaction time and a greater limit diam. than NH_4NO_3. Frank Gonet



BC BELAIEV AF

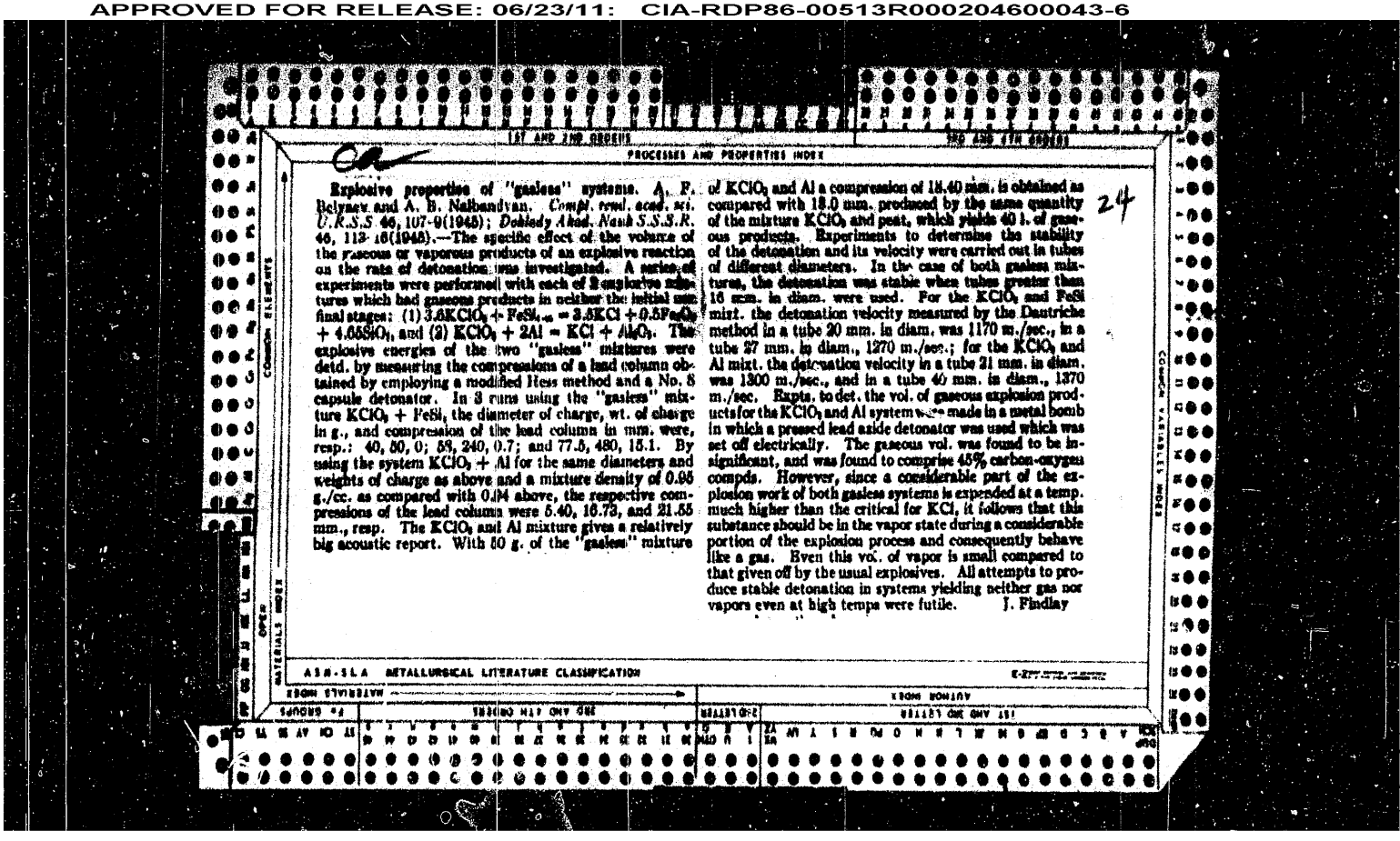
Transmission of a detonation between initiating explosive substances. I. General aspect of the phenomenon. A. F. BELAEV and J. B. CHARITON. **II. Influence of the distance between the charges and the effect of the surface area of the passive charge on the probability of transmission of a detonation.** A. F. BELAEV, J. B. CHARITON, and E. RDULTOVSKAJA. **III. Size of the particles transmitting the detonation.** A. F. BELAEV and J. B. CHARITON (Acta Physicochim. U.R.S.S., 1936, 5, 757—760, 767—776, 777—784).—I. The detonation of a 0·002-g. crystal of PbN_6 (active charge) is transmitted in vac. through distances of the order of 40 cm. to another crystal of PbN_6 (passive charge). The detonation of the passive charge can be prevented by a screen placed between the two charges, whilst the detonation can be transmitted through apertures in the screen. The sensitivity of PbN_6 is affected by exposure to air. The probability of transmission over a given distance depends on the method of preparing the passive charge and on its surface area. Detonation appears to be transmitted by microscopic particles scattered at a velocity of the order of 3 km. per sec. in vac., and at approx. half this velocity in air at a pressure of 12 mm. of Hg.

II. On the assumption that a single microscopic particle is sufficient to detonate the passive charge, the probability of detonation by transmission has been calc. for various distances between the charges, and for various surface areas of the passive charge. The data suggest that the transmission of particles is non-uniform, and is less uniform than that of a random distribution.

III. Calculation gives the no., linear dimensions, and mass of particles ejected from 0·0017 g. active charge as being of the order of 4×10^3, 10^{-4} cm., and 10^{-11} g., respectively. The law of retardation of a high-speed microscopic particle in air has been deduced. The mechanical action of the particles when they strike a glass surface is described.

C. R. H.

ASH-SLA METALLURGICAL LITERATURE CLASSIFICATION

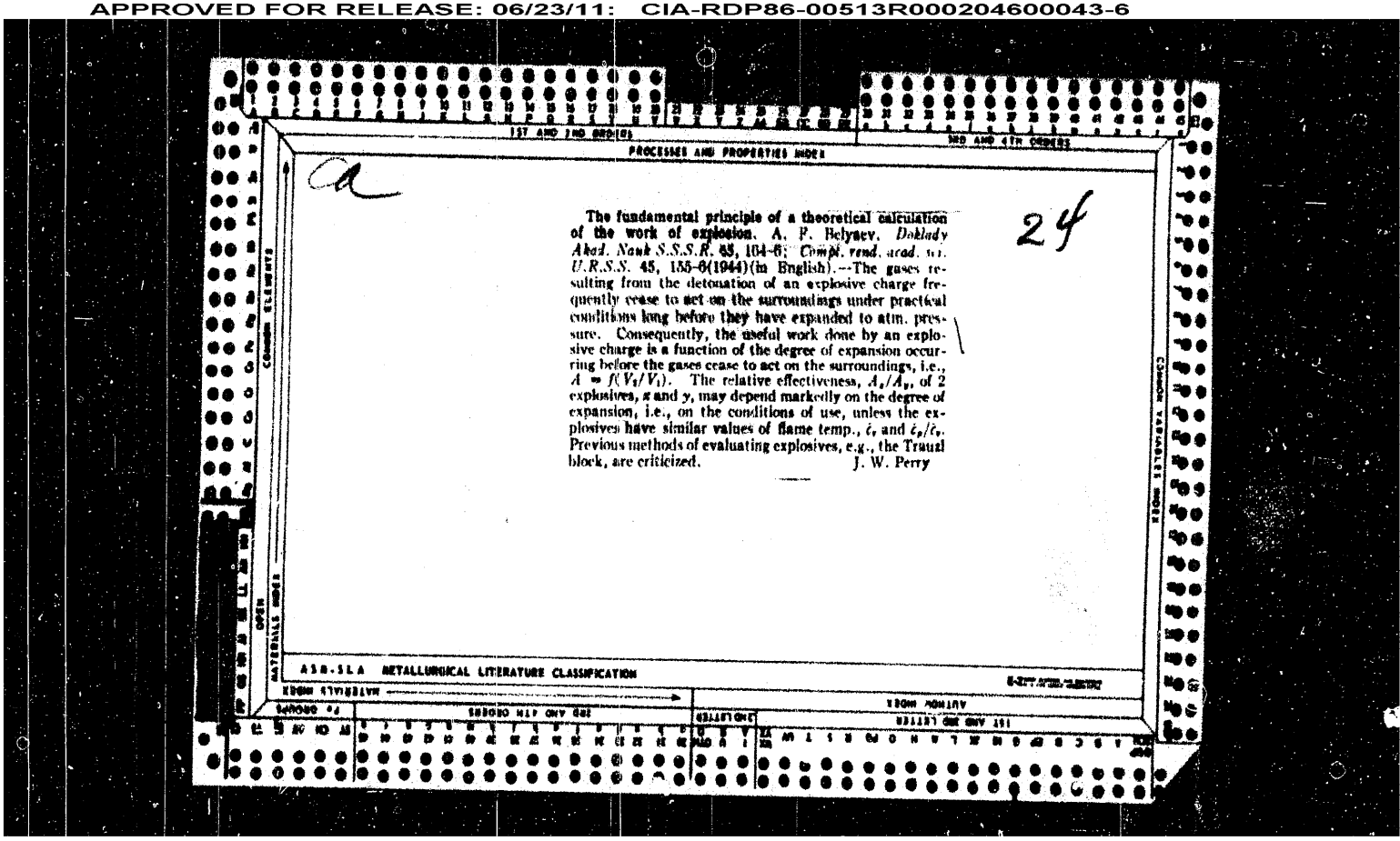


PROCESSES AND PROPERTIES INDEX

24

Explosive properties of "gasless" systems. A. F. Belyaev and A. B. Nalbandyan. *Compt. rend. acad. sci. U.R.S.S.* 46, 107-9(1945); *Doklady Akad. Nauk S.S.S.R.* 46, 113-16(1945).—The specific effect of the volume of the gaseous or vaporous products of an explosive reaction on the rate of detonation was investigated. A series of experiments were performed with each of 2 explosive mixtures which had gaseous products in neither the initial nor final stages: (1) $3.5KClO_4 + FeSi_{4.48} = 3.5KCl + 0.5Fe_2O_3 + 4.65SiO_2$, and (2) $KClO_4 + 2Al = KCl + Al_2O_3$. The explosive energies of the two "gasless" mixtures were detd. by measuring the compressions of a lead column obtained by employing a modified Hess method and a No. 8 capsule detonator. In 3 runs using the "gasless" mixture $KClO_4$ + $FeSi_4$, the diameter of charge, wt. of charge in g., and compression of the lead column in mm. were, resp.: 40, 50, 0; 58, 240, 0.7; and 77.5, 480, 15.1. By using the system $KClO_4$ + Al for the same diameters and weights of charge as above and a mixture density of 0.95 g./cc. as compared with 0.84 above, the respective compressions of the lead column were 5.40, 16.73, and 21.55 mm., resp. The $KClO_4$ and Al mixture gives a relatively big acoustic report. With 50 g. of the "gasless" mixture of $KClO_4$ and Al a compression of 18.40 mm. is obtained as compared with 18.0 mm. produced by the same quantity of the mixture $KClO_4$ and peat, which yields 40 l. of gaseous products. Experiments to determine the stability of the detonation and its velocity were carried out in tubes of different diameters. In the case of both gasless mixtures, the detonation was stable when tubes greater than 16 mm. in diam. were used. For the $KClO_4$ and FeSi mixt. the detonation velocity measured by the Dautriche method in a tube 20 mm. in diam. was 1170 m./sec., in a tube 27 mm. in diam., 1270 m./sec.; for the $KClO_4$ and Al mixt. the detonation velocity in a tube 21 mm. in diam. was 1300 m./sec., and in a tube 40 mm. in diam., 1370 m./sec. Expts. to det. the vol. of gaseous explosion products for the $KClO_4$ and Al system were made in a metal bomb in which a pressed lead azide detonator was used which was set off electrically. The gaseous vol. was found to be insignificant, and was found to comprise 45% carbon-oxygen compds. However, since a considerable part of the explosion work of both gasless systems is expended at a temp. much higher than the critical for KCl, it follows that this substance should be in the vapor state during a considerable portion of the explosion process and consequently behave like a gas. Even this vol. of vapor is small compared to that given off by the usual explosives. All attempts to produce stable detonation in systems yielding neither gas nor vapors even at high temps were futile. J. Findlay

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



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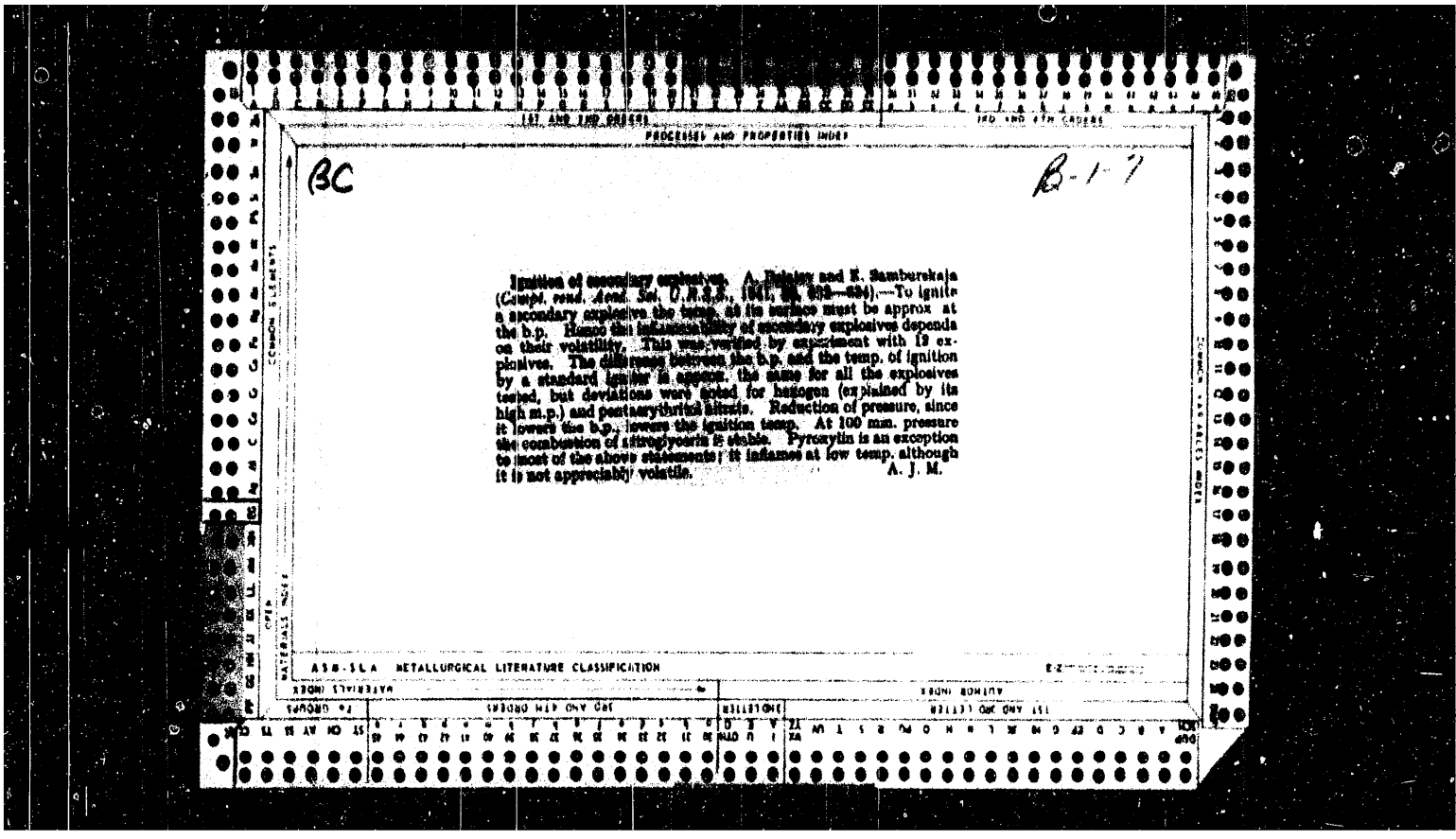
24

The fundamental principle of a theoretical calculation of the work of explosion. A. F. Belyaev. *Doklady Akad. Nauk S.S.S.R.* **45**, 104-6; *Compt. rend. acad. sci. U.R.S.S.* **45**, 155-6(1944)(in English).—The gases resulting from the detonation of an explosive charge frequently cease to act on the surroundings under practical conditions long before they have expanded to atm. pressure. Consequently, the useful work done by an explosive charge is a function of the degree of expansion occurring before the gases cease to act on the surroundings, i.e., $A = f(V_1/V_0)$. The relative effectiveness, A_x/A_y, of 2 explosives, x and y, may depend markedly on the degree of expansion, i.e., on the conditions of use, unless the explosives have similar values of flame temp., t_i and t_x/t_y. Previous methods of evaluating explosives, e.g., the Trauzl block, are criticized. J. W. Perry

BELYAYEV, A. F.

"Damping of Detonation in Elongated Charges on Increased Initiation," Dok. AN 38, Nos. 5-6, 1943.

Mbr., Inst. Chemical Physics, Dept. Chem. Sci., AS



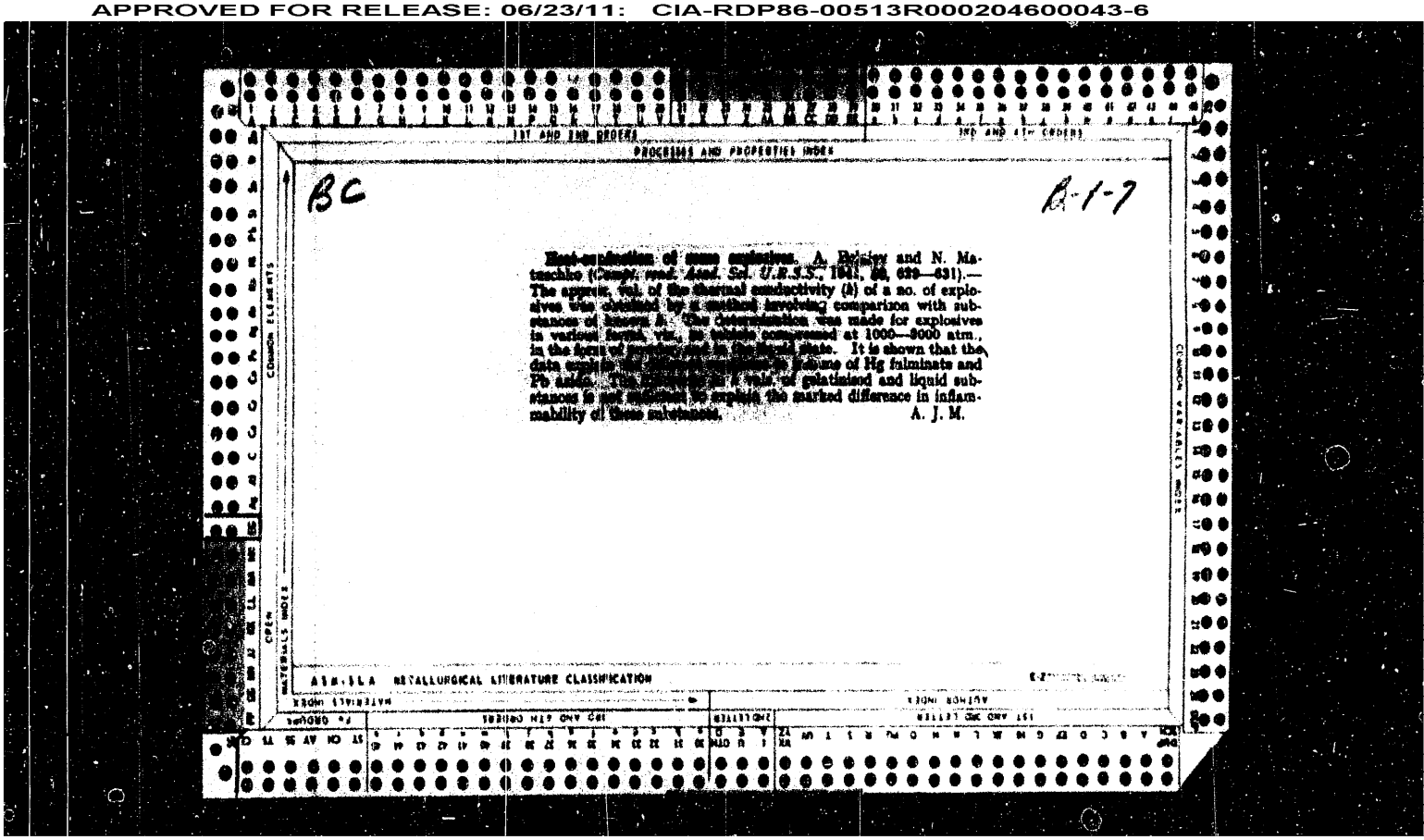
PROCESSES AND PROPERTIES INDEX

BC

B-1-7

Ignition of secondary explosives. A. Belajev and K. Šamberskaja (*Compt. rend. Acad. Sci. U.R.S.S.*, [1941], 30, 633—634).—To ignite a secondary explosive the temp. at its surface must be approx. at the b.p. Hence the inflammability of secondary explosives depends on their volatility. This was verified by experiment with 12 explosives. The difference between the b.p. and the temp. of ignition by a standard igniter is approx. the same for all the explosives tested, but deviations were noted for halogen (explained by its high m.p.) and pentaerythritol nitrate. Reduction of pressure, since it lowers the b.p., lowers the ignition temp. At 100 mm. pressure the combustion of nitroglycerin is stable. Pyroxylin is an exception to most of the above statements; it inflames at low temp. although it is not appreciably volatile. A. J. M.

A.S.M.-S.L.A. METALLURGICAL LITERATURE CLASSIFICATION



BC

B-1-7

Heat-explosion of some explosives. A. Brisov and N. Matsenko (Compt. rend. Acad. Sci. U.R.S.S., 1941, 30, 629—631).—The apparent vol. of the thermal conductivity (λ) of a no. of explosives was obtained by a method involving comparison with substances of known λ. The determination was made for explosives in various forms, viz., as powder compressed at 1000—9000 atm., in the form of [illegible] and in the fused state. It is shown that the data explain [illegible] volume of Hg fulminate and Pb azide. [illegible] gelatinised and liquid substances is not sufficient to explain the marked difference in inflammability of these substances.

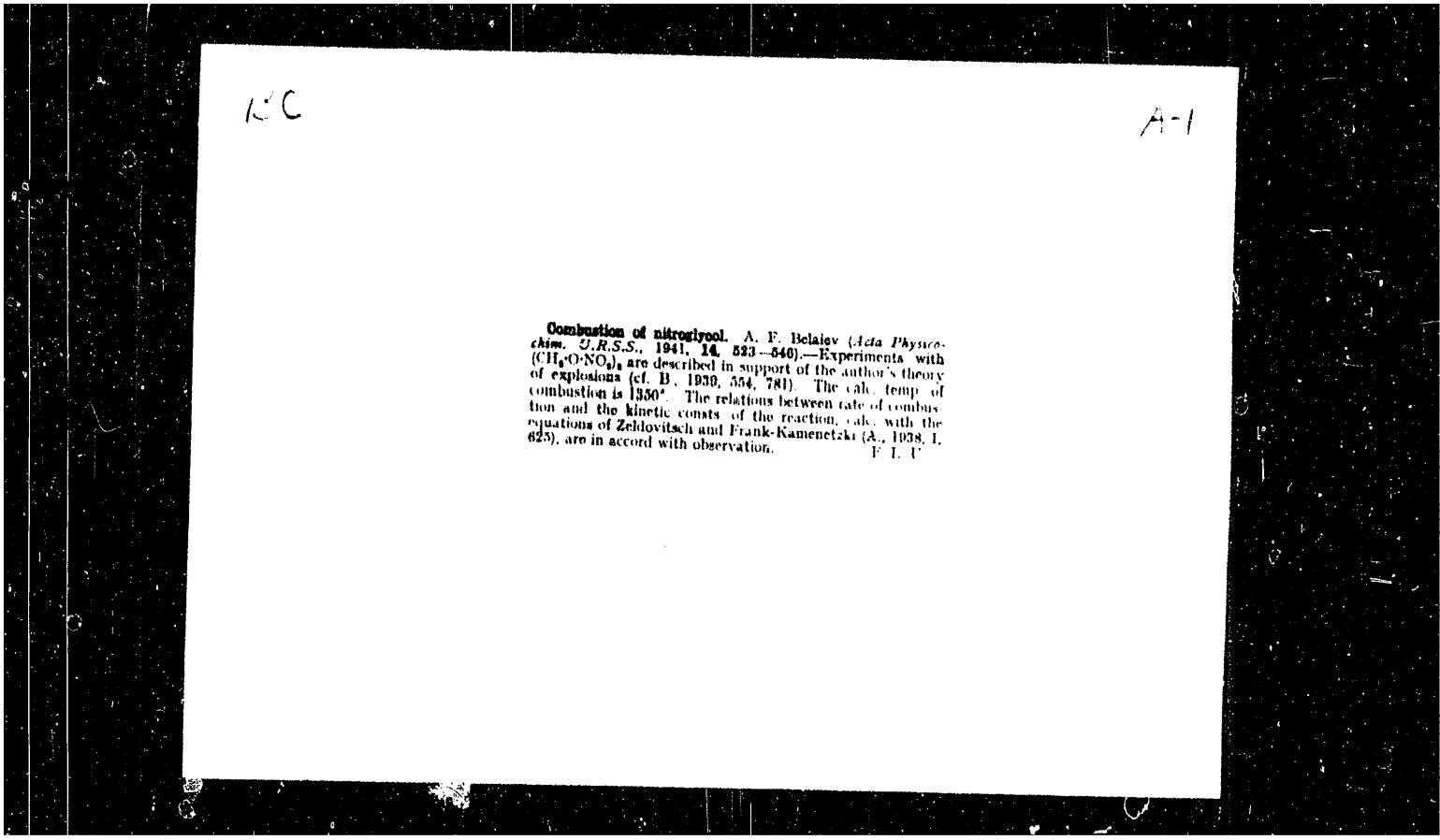
A. J. M.

Burning of mercury fulminate at low pressures. A. F. Belyaev and A. E. Belyaeva (*Compt. rend. Acad. Sci. U.R.S.S.*, 1941, **33**, 41–44).—The burning of Hg fulminate at pressures from 760 mm. down to 2–3 mm. has been investigated. The brightness of the flame decreases considerably as the pressure is reduced, and at 8 mm. it is scarcely visible. The velocity of combustion, however, is practically unaltered by pressure. At 20 mm. the vol. of gas produced in the combustion is only 15–20% of that expected if combustion had been complete, and there is a considerable deposit of Hg fulminate contaminated with Hg. An explanation of the phenomena is advanced. V. J. M.

BELYAYEV, A. F.

"Concerning the Burning of Fulminating Quicksilver in a Partial Vacuum," Dok. AN 33, No. 1, 1941.

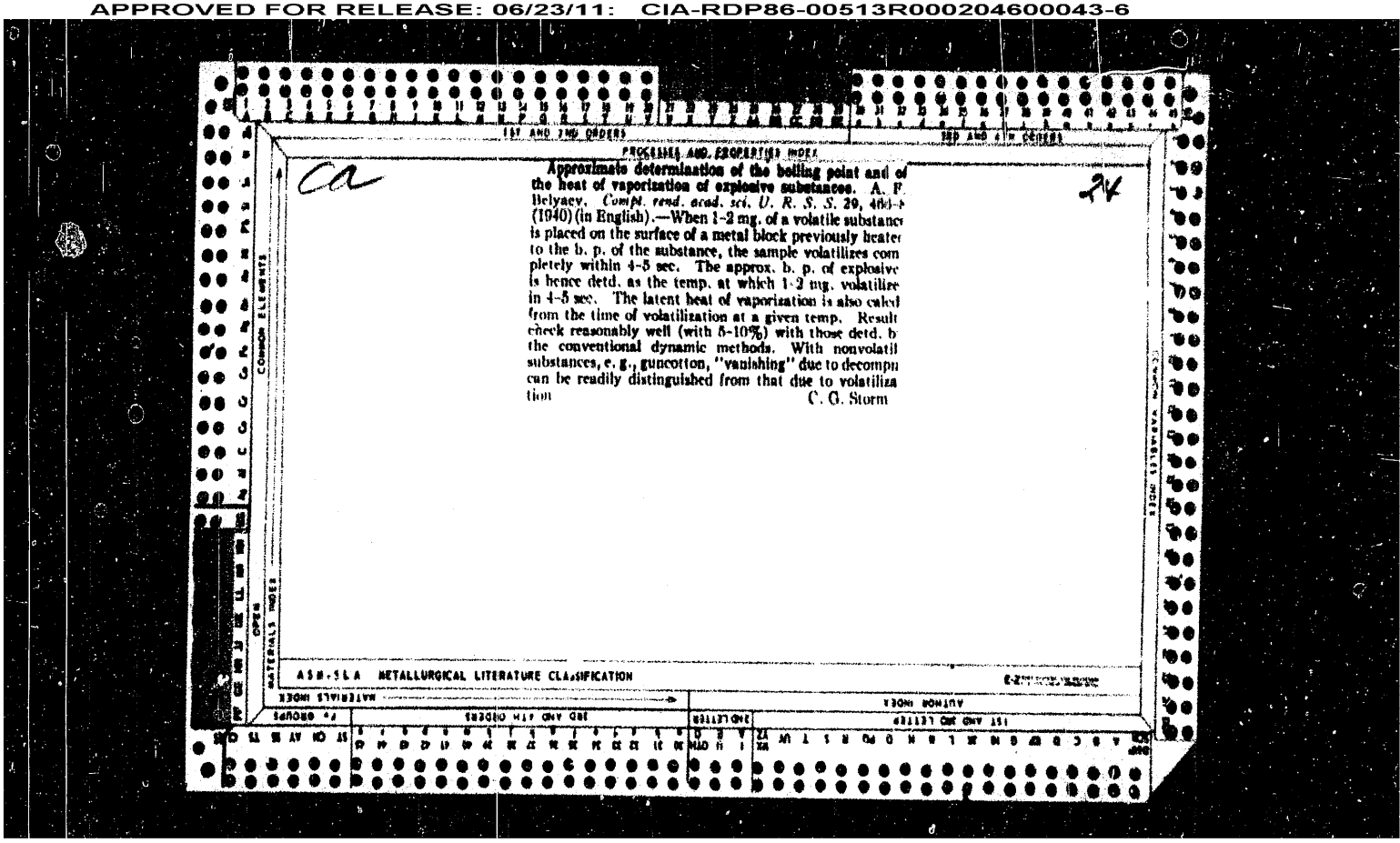
Mbr., Inst. Chemical Physics, Dept. Chem. Sci., AS



1 C

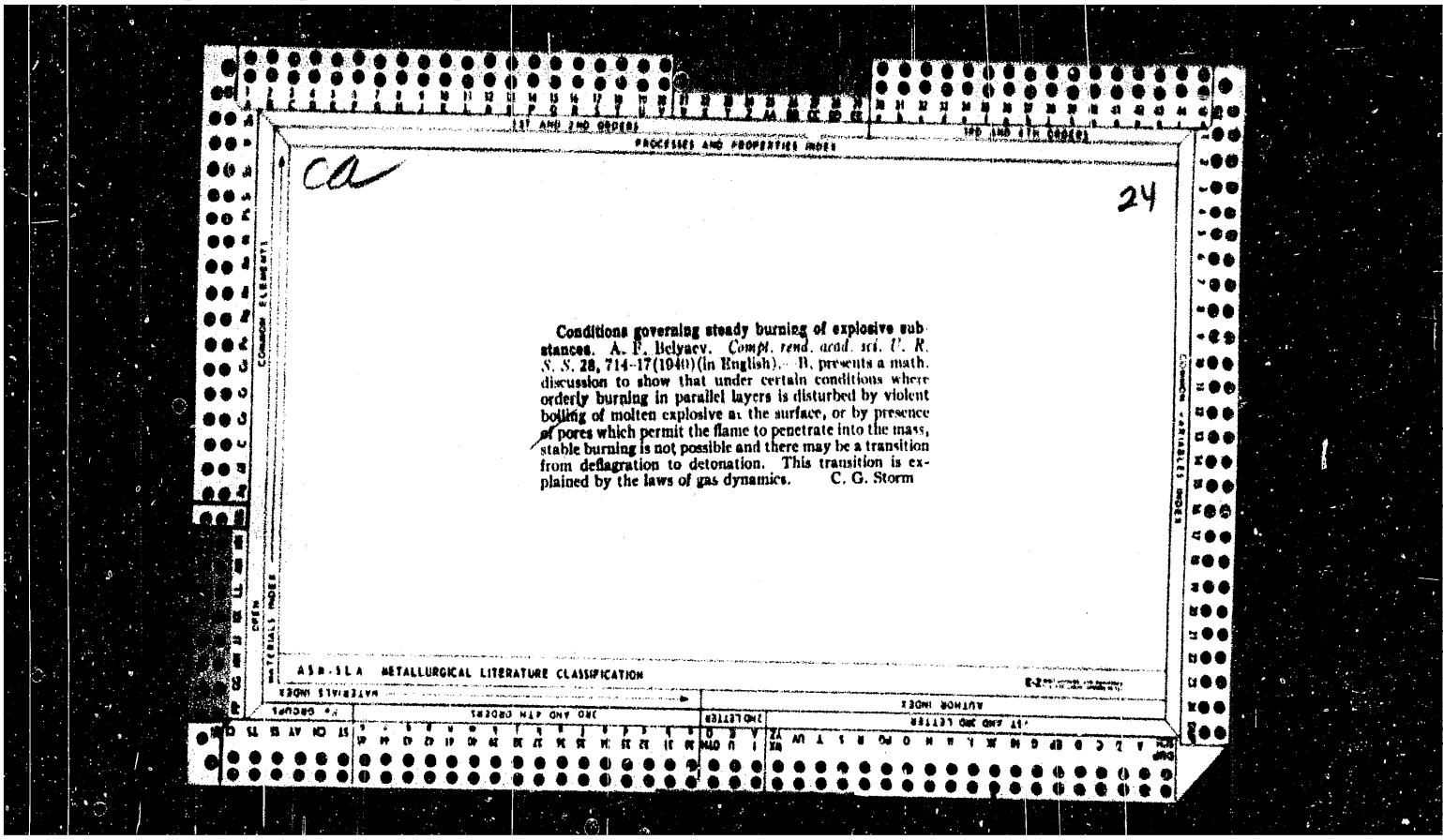
A-1

Combustion of nitroglycol. A. F. Belaiev (*Acta Physicochim. U.R.S.S.*, 1941, **14**, 523—540).—Experiments with $(CH_2{\cdot}O{\cdot}NO_2)_2$ are described in support of the author's theory of explosions (cf. B., 1939, 554, 781). The calc. temp. of combustion is 1350°. The relations between rate of combustion and the kinetic consts. of the reaction, calc. with the equations of Zeldovitsch and Frank-Kamenetzki (A., 1938, I, 625), are in accord with observation. F. L. U.



Approximate determination of the boiling point and of the heat of vaporization of explosive substances. A. F. Belyaev. *Compt. rend. acad. sci. U. R. S. S.* 29, 4[illegible] (1940) (in English).—When 1-2 mg. of a volatile substance is placed on the surface of a metal block previously heated to the b. p. of the substance, the sample volatilizes completely within 4-5 sec. The approx. b. p. of explosive is hence detd. as the temp. at which 1-2 mg. volatilizes in 4-5 sec. The latent heat of vaporization is also calcd from the time of volatilization at a given temp. Results check reasonably well (with 5-10%) with those detd. by the conventional dynamic methods. With nonvolatile substances, e. g., guncotton, "vanishing" due to decomposition can be readily distinguished from that due to volatilization

C. G. Storm



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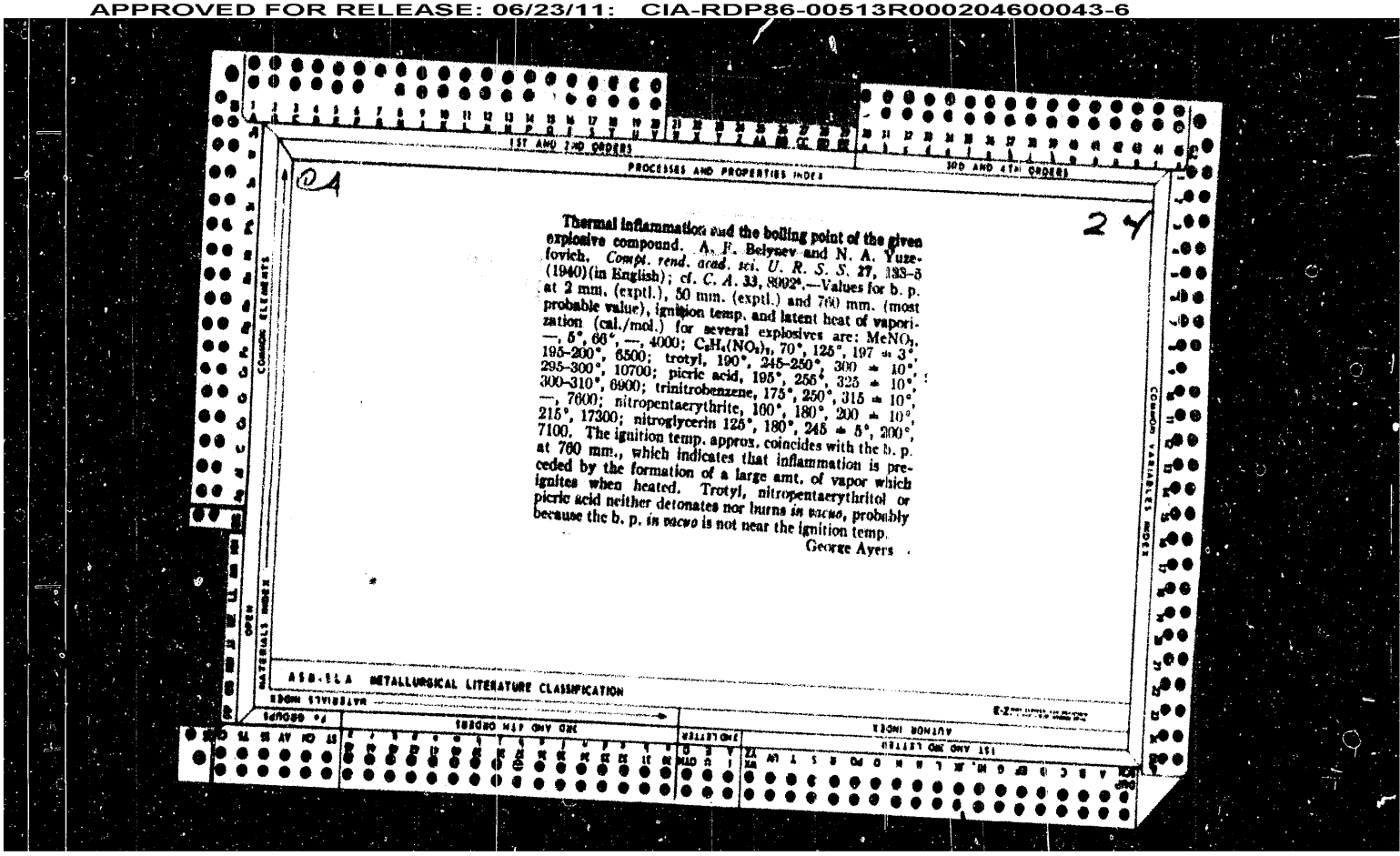
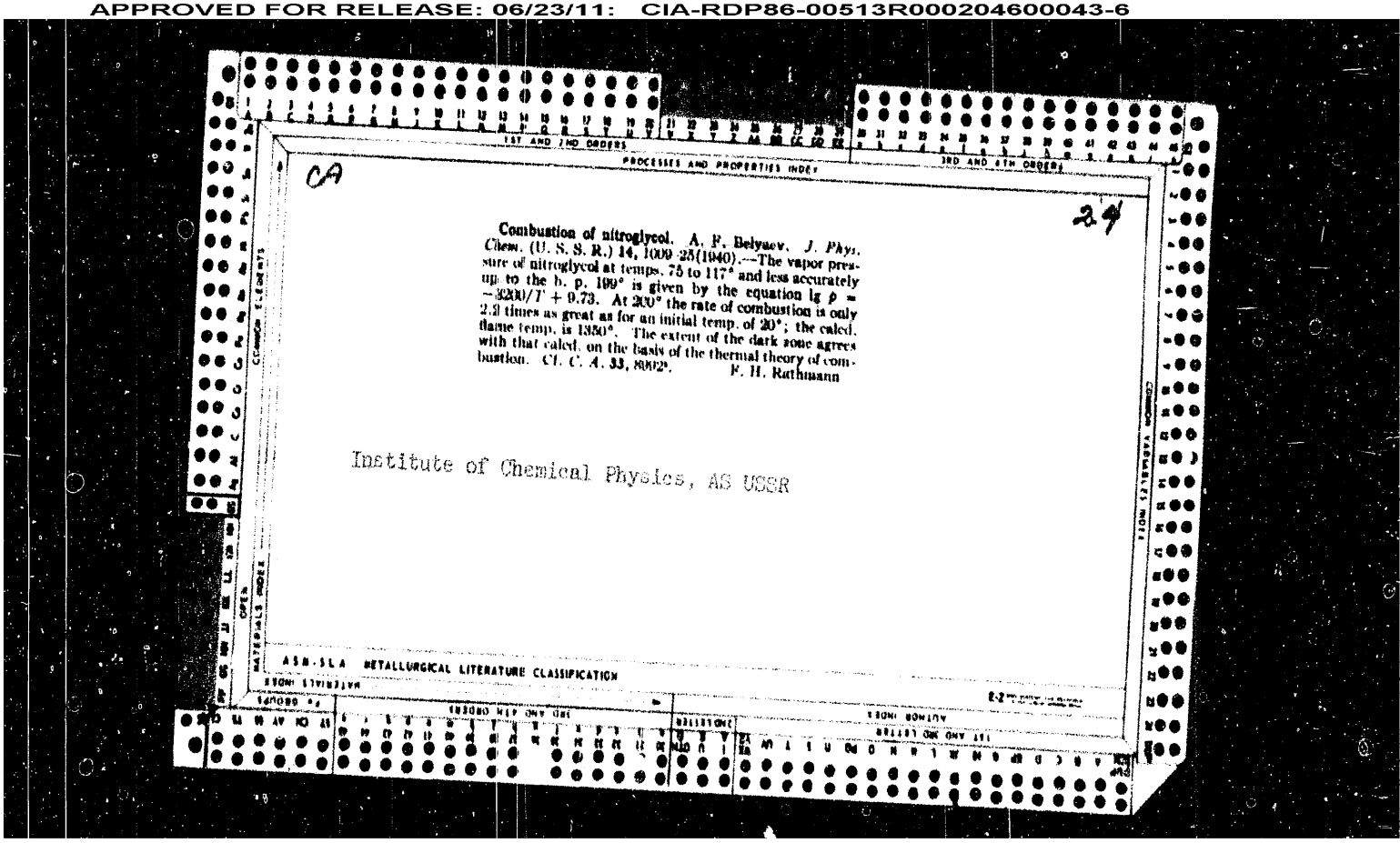
24

Conditions governing steady burning of explosive substances. A. F. Belyaev. *Compt. rend. acad. sci. U. R. S. S.* **28**, 714–17(1940)(in English).—B. presents a math. discussion to show that under certain conditions where orderly burning in parallel layers is disturbed by violent boiling of molten explosive at the surface, or by presence of pores which permit the flame to penetrate into the mass, stable burning is not possible and there may be a transition from deflagration to detonation. This transition is explained by the laws of gas dynamics. C. G. Storm

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION



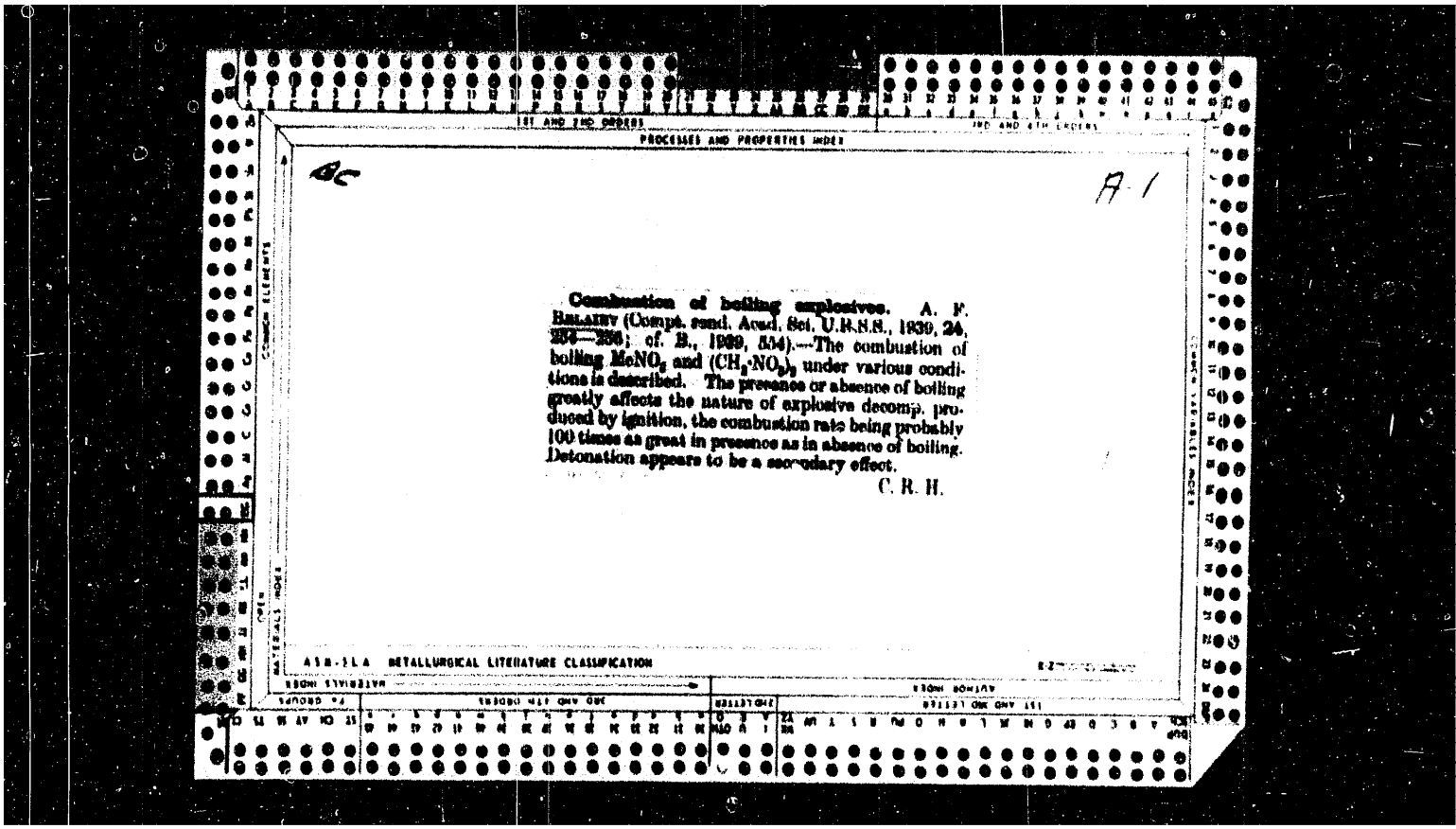


CA

24

Combustion of nitroglycol. A. F. Belyaev. *J. Phys. Chem. (U. S. S. R.)* **14**, 1009-25(1940).—The vapor pressure of nitroglycol at temps. 75 to 117° and less accurately up to the b. p. 199° is given by the equation $\lg p = -3220/T + 9.73$. At 200° the rate of combustion is only 2.3 times as great as for an initial temp. of 20°; the calcd. flame temp. is 1350°. The extent of the dark zone agrees with that calcd. on the basis of the thermal theory of combustion. Cf. *C. A.* **33**, 8902°. F. H. Ruthmann

Institute of Chemical Physics, AS USSR



PROCESSES AND PROPERTIES INDEX

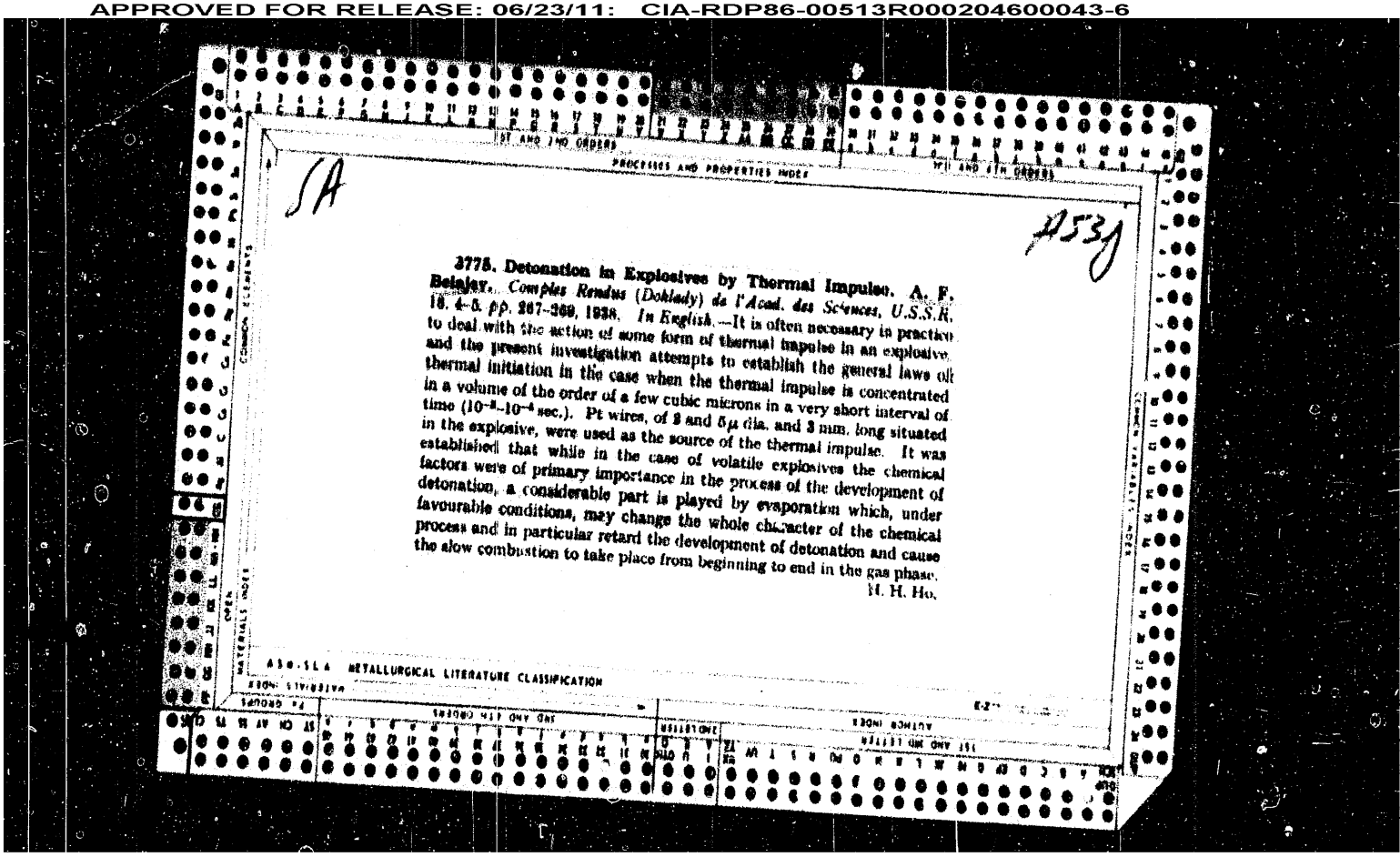
Ac

A-1

Combustion of boiling explosives. A. F. BELAJEV (Compt. rend. Acad. Sci. U.R.S.S., 1939, **24**, 255—256; cf. B., 1939, 534).—The combustion of boiling $MeNO_3$ and $(CH_2 \cdot NO_3)_2$ under various conditions is described. The presence or absence of boiling greatly affects the nature of explosive decomp. produced by ignition, the combustion rate being probably 100 times as great in presence as in absence of boiling. Detonation appears to be a secondary effect.

C. R. H.

ASM-31A METALLURGICAL LITERATURE CLASSIFICATION



PROCESSES AND PROPERTIES INDEX

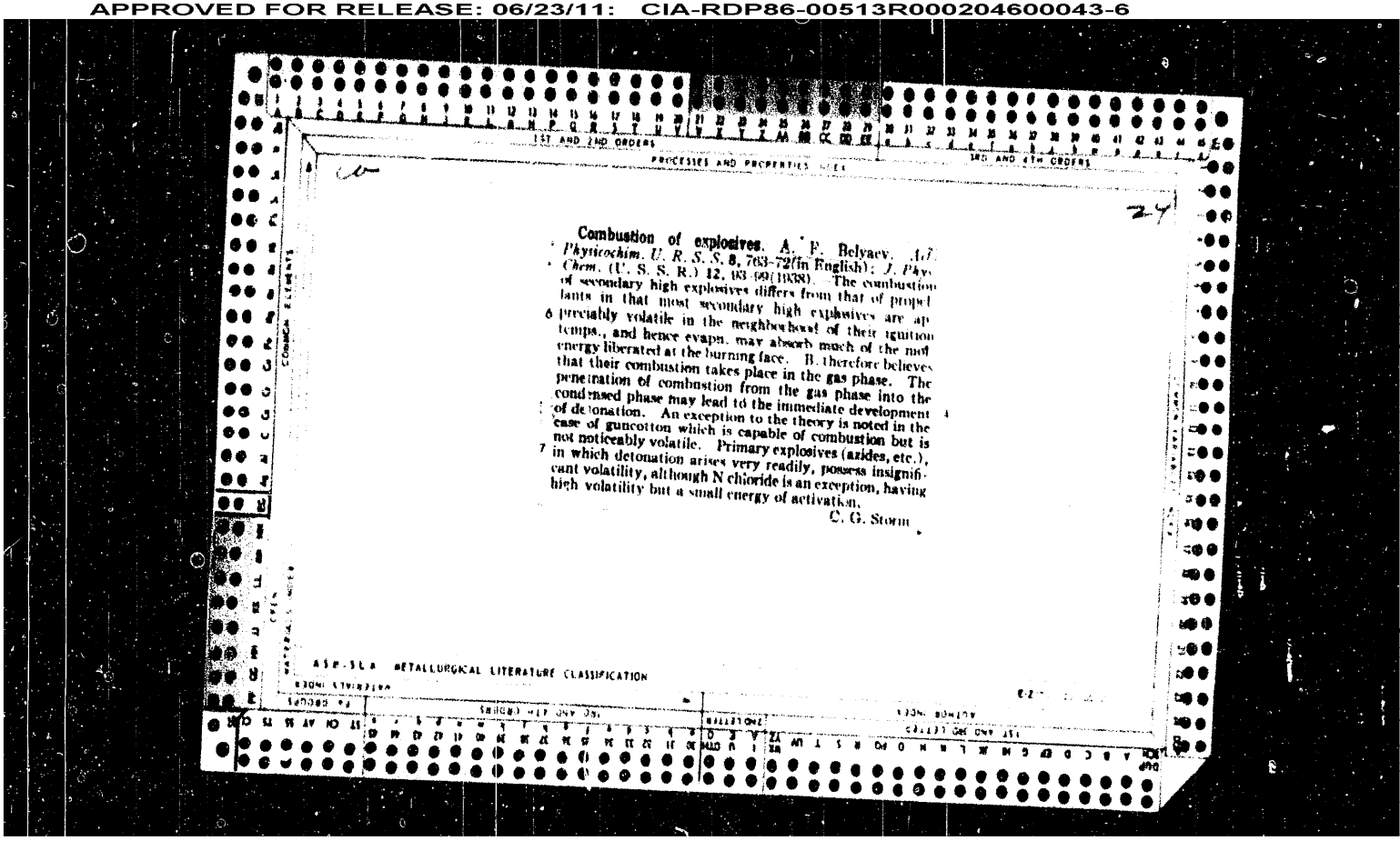
SA

A53J

3775. Detonation in Explosives by Thermal Impulse. A. F. Belajev. *Comptes Rendus (Doklady) de l'Acad. des Sciences, U.S.S.R.*, 18, 4–5, *pp.* 267–269, 1938. *In English.*—It is often necessary in practice to deal with the action of some form of thermal impulse in an explosive, and the present investigation attempts to establish the general laws of thermal initiation in the case when the thermal impulse is concentrated in a volume of the order of a few cubic microns in a very short interval of time (10^{-3}–10^{-4} sec.). Pt wires, of 2 and 5μ dia. and 3 mm. long situated in the explosive, were used as the source of the thermal impulse. It was established that while in the case of volatile explosives the chemical factors were of primary importance in the process of the development of detonation, a considerable part is played by evaporation which, under favourable conditions, may change the whole character of the chemical process and in particular retard the development of detonation and cause the slow combustion to take place from beginning to end in the gas phase.

H. H. Ho.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

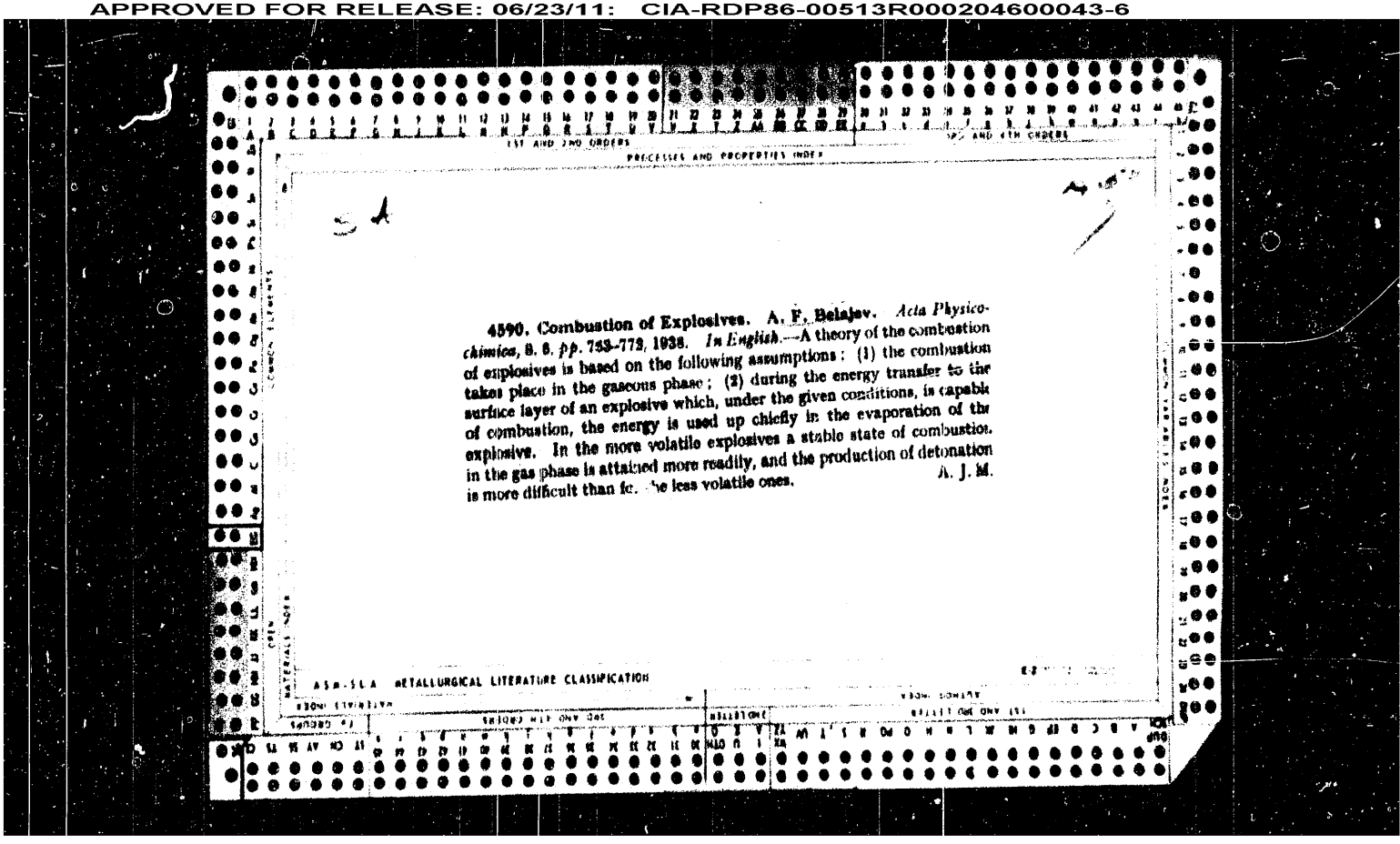
3RD AND 4TH ORDERS

24

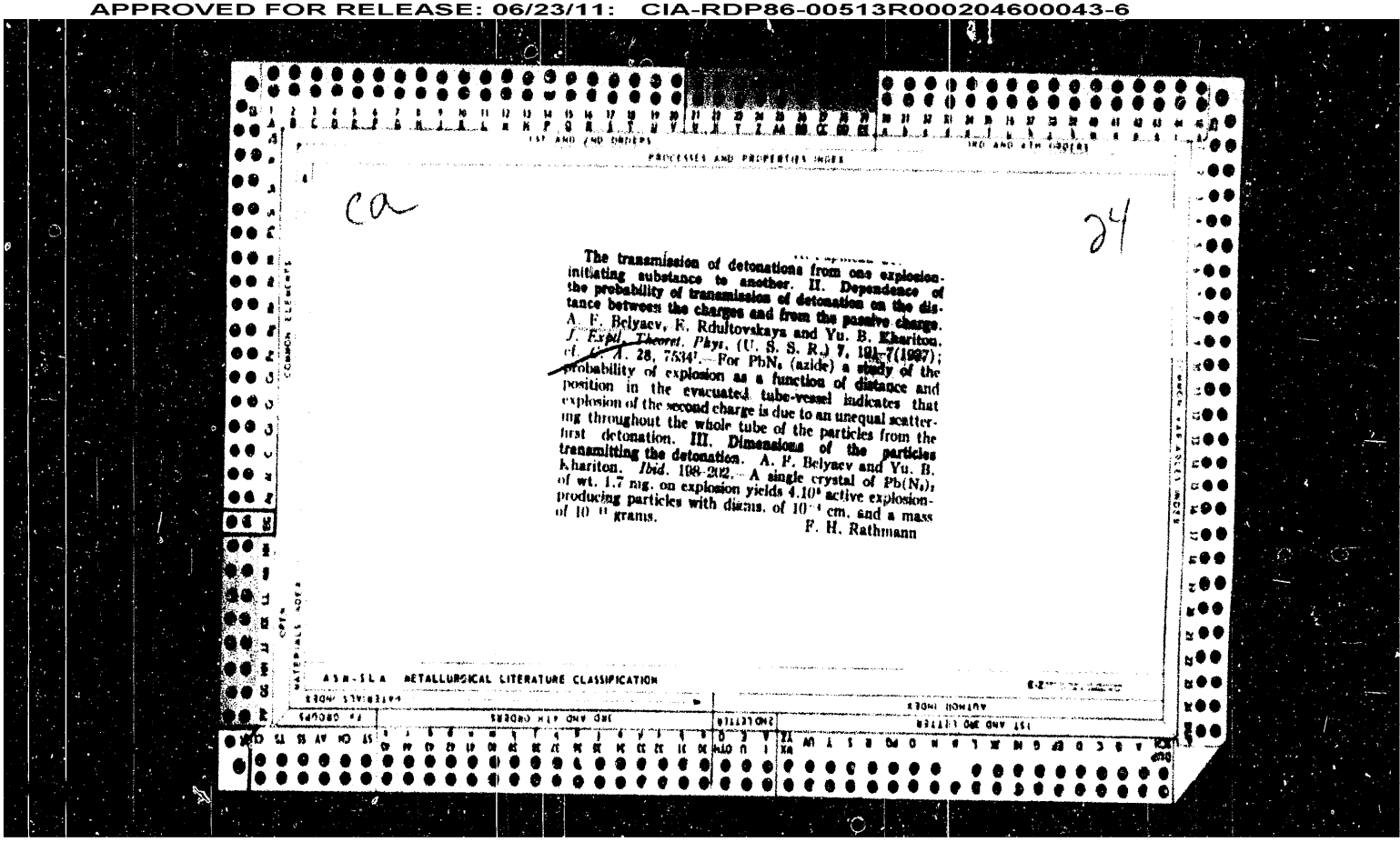
Combustion of explosives. A. F. Belyaev. *Acta Physicochim. U. R. S. S.* **8**, 763–72(in English); *J. Phys. Chem.* (U. S. S. R.) **12**, 93–99(1938). The combustion of secondary high explosives differs from that of propellants in that most secondary high explosives are appreciably volatile in the neighborhood of their ignition temps., and hence evapn. may absorb much of the mol energy liberated at the burning face. B. therefore believes that their combustion takes place in the gas phase. The penetration of combustion from the gas phase into the condensed phase may lead to the immediate development of detonation. An exception to the theory is noted in the case of guncotton which is capable of combustion but is not noticeably volatile. Primary explosives (azides, etc.), in which detonation arises very readily, possess insignificant volatility, although N chloride is an exception, having high volatility but a small energy of activation.

C. G. Storm

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



4590. Combustion of Explosives. A. F. Belajev. *Acta Physicochimica*, 8. 8. *pp.* 753-772, 1938. *In English.*—A theory of the combustion of explosives is based on the following assumptions: (1) the combustion takes place in the gaseous phase; (2) during the energy transfer to the surface layer of an explosive which, under the given conditions, is capable of combustion, the energy is used up chiefly in the evaporation of the explosive. In the more volatile explosives a stable state of combustion in the gas phase is attained more readily, and the production of detonation is more difficult than fc. the less volatile ones. A. J. M.

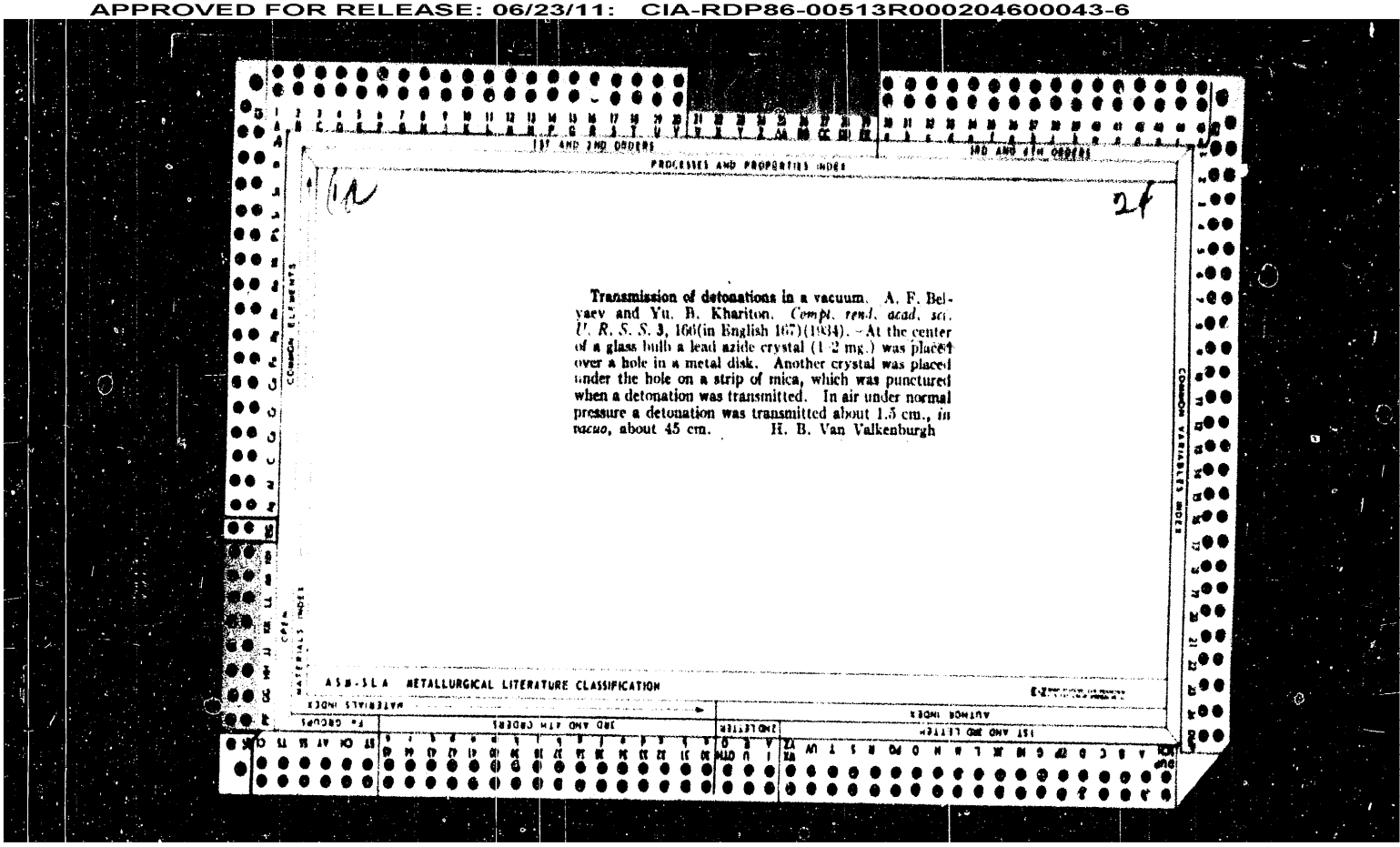


ca

24

The transmission of detonations from one explosion-initiating substance to another. II. Dependence of the probability of transmission of detonation on the distance between the charges and from the passive charge. A. F. Belyaev, F. Rdultovskaya and Yu. B. Khariton. *J. Exptl. Theoret. Phys.* (U. S. S. R.) 7, 101–7(1937); cf. *C. A.* 28, 7534[1]. For PbN_6 (azide) a study of the probability of explosion as a function of distance and position in the evacuated tube-vessel indicates that explosion of the second charge is due to an unequal scattering throughout the whole tube of the particles from the first detonation. **III. Dimensions of the particles transmitting the detonation.** A. F. Belyaev and Yu. B. Khariton. *Ibid.* 198–202. A single crystal of $Pb(N_3)_2$ of wt. 1.7 mg. on explosion yields 4.10^8 active explosion-producing particles with diams. of 10^{-4} cm. and a mass of 10^{-11} grams.

F. H. Rathmann



PROCESSES AND PROPERTIES INDEX

24

Transmission of detonations in a vacuum. A. F. Belyaev and Yu. B. Khariton. *Compt. rend. acad. sci. U. R. S. S.* **3**, 166(in English 167)(1934). – At the center of a glass bulb a lead azide crystal (1–2 mg.) was placed over a hole in a metal disk. Another crystal was placed under the hole on a strip of mica, which was punctured when a detonation was transmitted. In air under normal pressure a detonation was transmitted about 1.5 cm., *in vacuo*, about 45 cm. H. B. Van Valkenburgh

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

BELYAYEV, A. F.

Teoriya Vzryvchtykh Veshchestv (by) K. K. Andreyev (1)
A. F. Belyayev. Moskva, Oborongiz, 1960.
595 p. Illus., diagrs., graphs, tables.
Bibliographical Footnotes.

skirts, and 60 mm on the eastern outskirts.

3(7)

AUTHOR: Belyayev, A. F.

SOV/50-59-2-13/25

TITLE: Heavy Rainfall at Rostov-na Donu (Sil'nyy liven' v Rostove...

PERIODICAL: Meteorologiya i gidrologiya, 1959, Nr 2, p 45 (USSR)

ABSTRACT: On June 16, 1958, at 5 a.m. a cloud formation was observed at Rostov-na-Donu. The weather was warm (19°), with slight wind (3-4 m/sec, NNW). Temperature cooled off about 7 p.m. from 25° - 15°. In the north and northwest the sky covered with rain clouds. The wind increased up to 10-12 m/sec. About 8 p.m. a distant thunderstorm was heard, followed by heavy rainfall. Visibility was only 100 m or even less. After 15 to 20 minutes streets were covered by 50-60 cm of water. The rain lasted for 30-40 minutes. A second rainfall occurred in the night between 2 and 3 a.m. Frequent thunderstrokes, sounding like exploding shells, were heard. The lightnings had the shape of a tree-like arrow and struck vertically. Between 8 p.m. to 7 a.m. of the following day precipitation was 71 mm in the town center, 87 mm on the northern out-

Card 1/2

L 47292-66

ACC NR: AP6032267

The burning velocity was found to increase considerably with an increase in pressure. The findings are in agreement with Zel'dovich's theory. Orig. art. has: 3 figures and 3 formulas.

[PV]

SUB CODE: 21/ SUBM DATE: 06Mar65/ ORIG REF: 009/ ATD PRESS: 5094

Card 2/2

L 47291-66 EWT(d)/EWT(m)/T/EWP(f) WW/JW/JWD

ACC NR: AP6032267 SOURCE CODE: UR/0076/66/040/009/2066/2070

AUTHOR: Belyayev, A. E.; Lukashenya, G. V. 66 B

ORG: Institute of Chemical Physics, Academy of Sciences SSSR (Institut khimicheskoy fiziki Akademii nauk SSSR)

TITLE: The temperature coefficient of the burning velocity in flameless powder combustion

SOURCE: Zhurnal fizicheskoy khimii, v. 40, no. 9, 1966, 2066-2070

TOPIC TAGS: solid propellant, combustion, explosive, solid propellant combustion

ABSTRACT: The temperature coefficient of the burning velocity in flameless powder combustion in a vacuum was determined experimentally using 5 mm in diameter samples of smokeless powder H heated to the initial temperature T_0 in a furnace. A copper-constantan thermocouple was mounted inside the samples with a weight to secure its motion by gravity. The combustion front passed through the point where the thermocouple was mounted, and then it moved by gravity with the combustion front. Plots of the surface temperature vs the initial temperature were found to be linear. The increase in the surface temperature was correlated with the increase in the initial temperature by the following formula $\Delta T_s = 0.8\ \Delta T_0$. The temperature coefficient of the burning velocity was found to be relatively large and amounted to $13 \cdot 10^{-3}$/grad.

Card 1/2 UDC: 541.126

L 2502-66
ACCESSION NR: AP5014607

300 -- 100K. The results show that the capture cross section depends also on the number of dislocations in the crystal, and that smaller values of n are obtained with samples having a smaller number of dislocations. Apparently, experimental values of n are larger than the theoretical ones because the theory does not provide for the contribution of the structural defects. "The authors thank Ye. G. Miselyuk and K. D. Glinchuk for a discussion of the work." Orig. art. has: 2 figures, 1 formula, and 1 table.

ASSOCIATION: Institut poluprovodnikov AN UkrSSR, Kiev (Institute of Semiconductors AN UkrSSR).

SUBMITTED: 22Jan65 ENCL: 00 SUB CODE: SS

NO REF SOV: 010 OTHER: 006

Card 2/2

L 2502-66 EWT(l)/EWT(m)/T/EWP(t)/EWP(b) IJP(c) JD/GG

ACCESSION NR: AP5014607 UR/0181/65/007/006/1894/1897

AUTHOR: Belyayev, A. D.; Malogolovets, S. S.

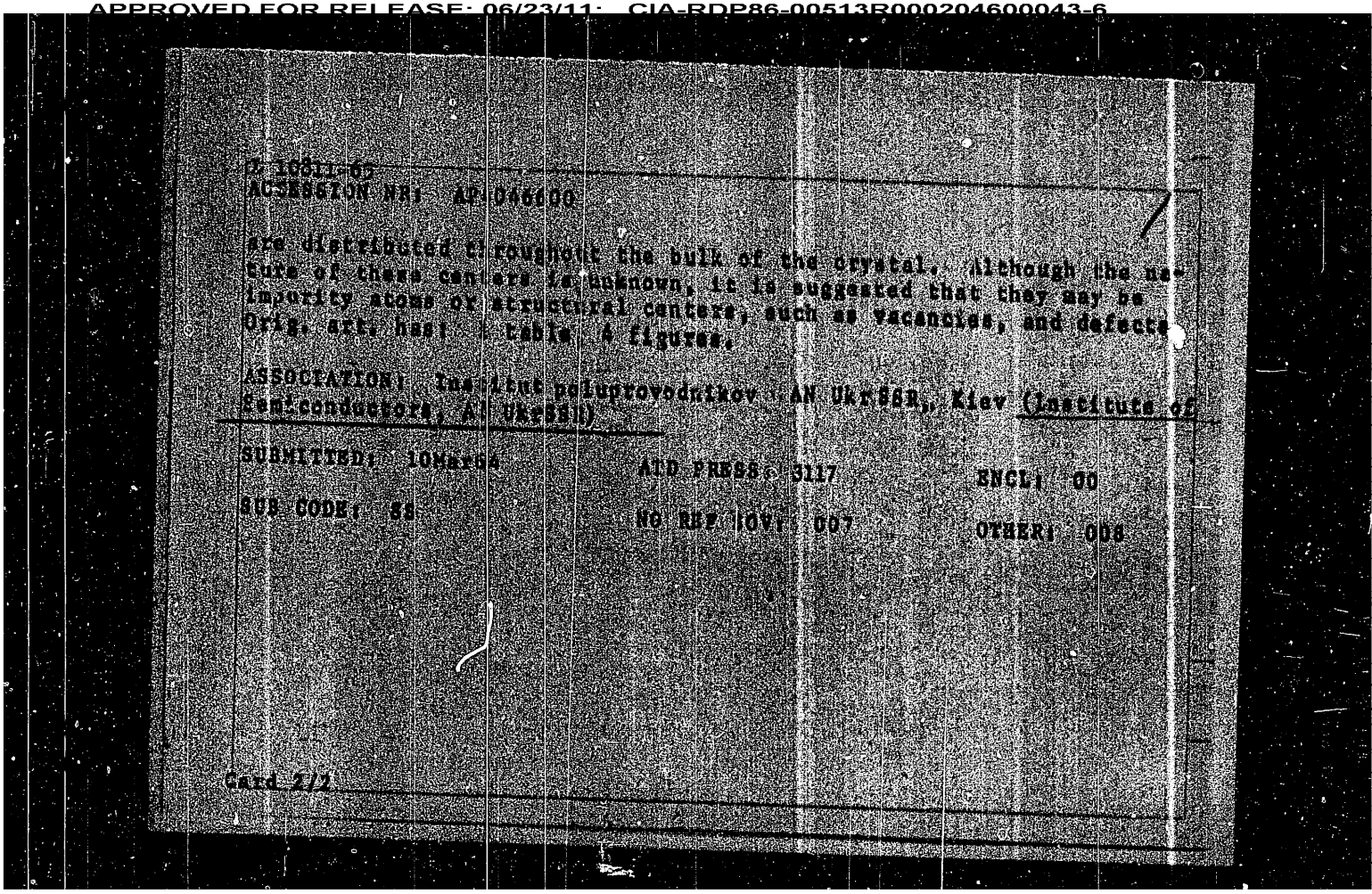
TITLE: On the temperature dependences of the capture cross section of holes by impurity centers in germanium

SOURCE: Fizika tverdogo tela, v. 7, no. 6, 1965, 1894-1897

TOPIC TAGS: germanium, semiconductor impurity, capture cross section, temperature dependence, impurity center

ABSTRACT: The authors present new experimental data on the temperature dependence of the cross section for the capture of holes by doubly charged iron ions in germanium, and discuss one possible reason why earlier experiments yielded for the theoretical relation $\sigma_k \sim T^{-n}$ (σ_k -- capture cross section, T -- temperature, n -- an exponent ranging between 1 and 4) values which were higher than predicted by the theory. The study is based on an earlier paper (FTT v. 5, 3043, 1963), the results of which have made possible to determine exactly the lifetime of the holes captured by the Fe^{--} ions. The procedure consists of measuring the photomagnetic emf in low-resistivity n-Ge doped with iron at different intensities of modulated light, with constant additional illumination and without it, in the temperature interval

Card 1/2



L 10811-65
ACCESSION NR: AP5006600

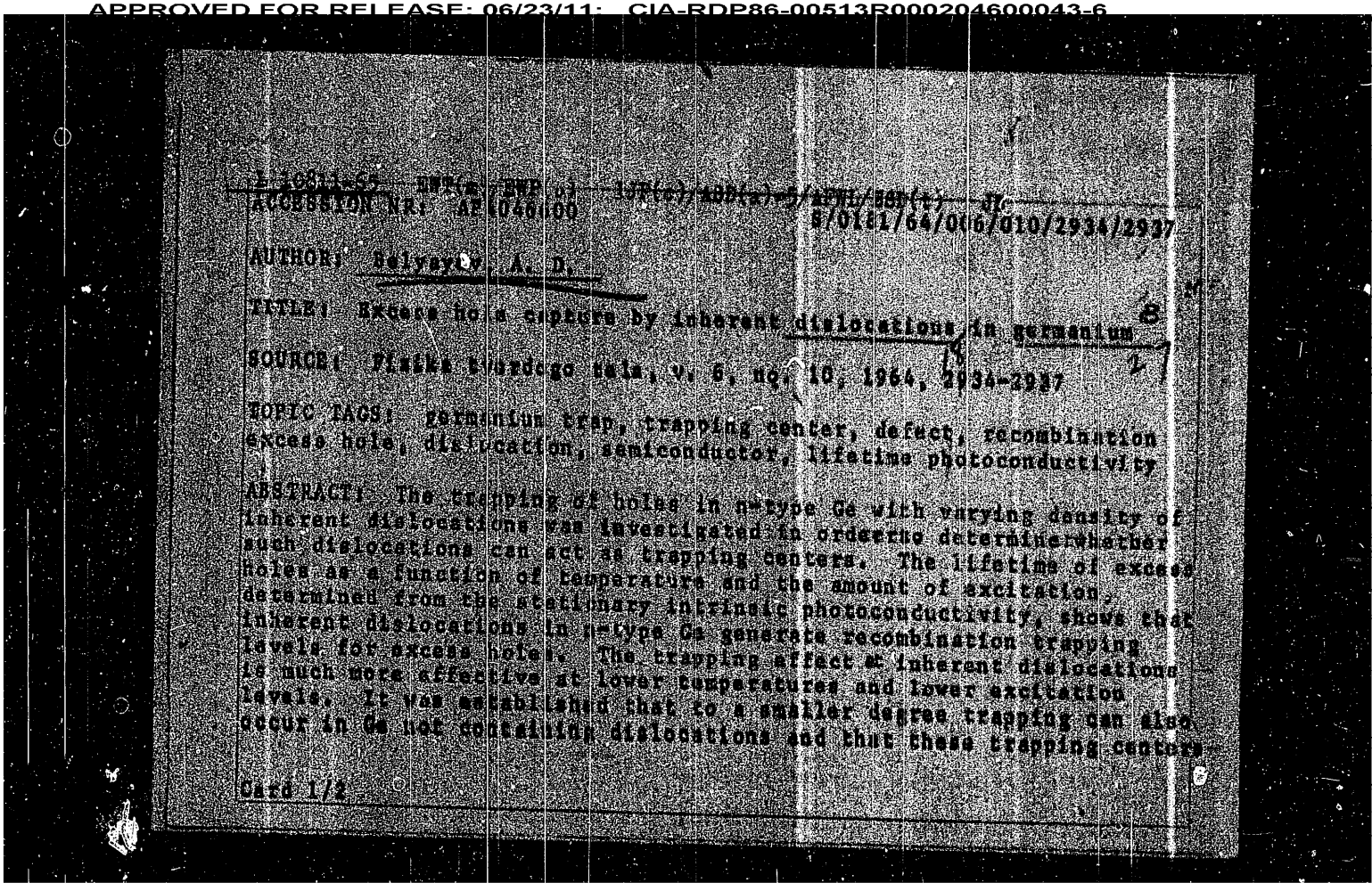
are distributed throughout the bulk of the crystal. Although the nature of these centers is unknown, it is suggested that they may be impurity atoms or structural centers, such as vacancies, and defects. Orig. art. has: 1 table, 4 figures.

ASSOCIATION: Institut poluprovodnikov AN Ukr SSR, Kiev (Institute of Semiconductors, AN UkrSSR)

SUBMITTED: 10Mar64 ATD PRESS: 3117 ENCL: 00

SUB CODE: SS NO REF SOV: 007 OTHER: 008

Card 2/2



L 10811-65 EWT(m)/EWP(t) IJP(c)/ASD(a)-5/AFWL/SSD(t) JG
ACCESSION NR: AP4046100 S/0181/64/006/010/2934/2937

AUTHOR: Belyayev, A. D.

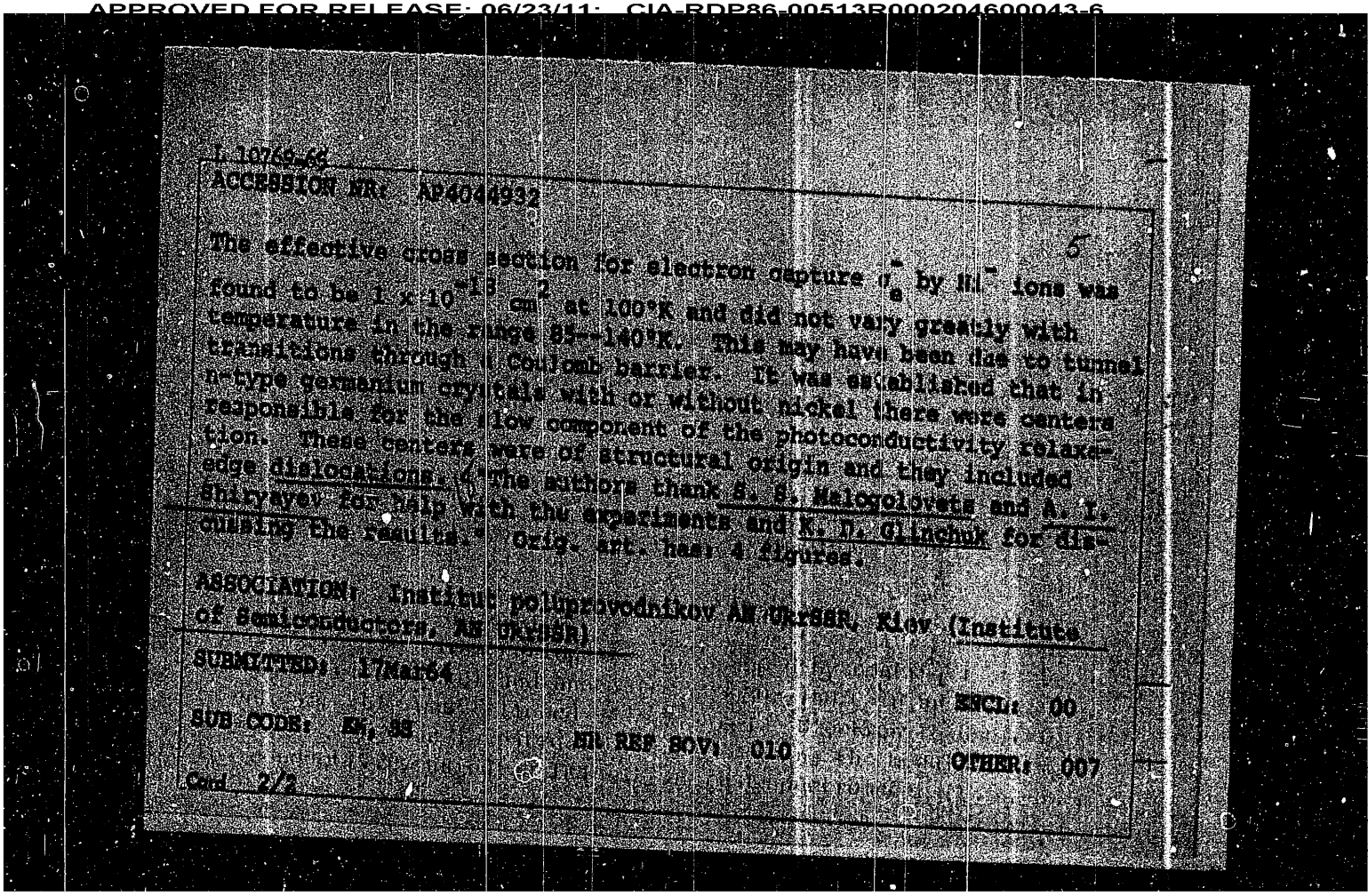
TITLE: Excess hole capture by inherent dislocations in germanium

SOURCE: Fizika tverdogo tela, v. 6, no. 10, 1964, 2934-2937

TOPIC TAGS: germanium trap, trapping center, defect, recombination, excess hole, dislocation, semiconductor, lifetime photoconductivity

ABSTRACT: The trapping of holes in n-type Ge with varying density of inherent dislocations was investigated in order to determine whether such dislocations can act as trapping centers. The lifetime of excess holes as a function of temperature and the amount of excitation, determined from the stationary intrinsic photoconductivity, shows that inherent dislocations in n-type Ge generate recombination trapping levels for excess holes. The trapping effect of inherent dislocations is much more effective at lower temperatures and lower excitation levels. It was established that to a smaller degree trapping can also occur in Ge not containing dislocations and that these trapping centers

Card 1/2



L 10769-65

ACCESSION NR: AP4044932

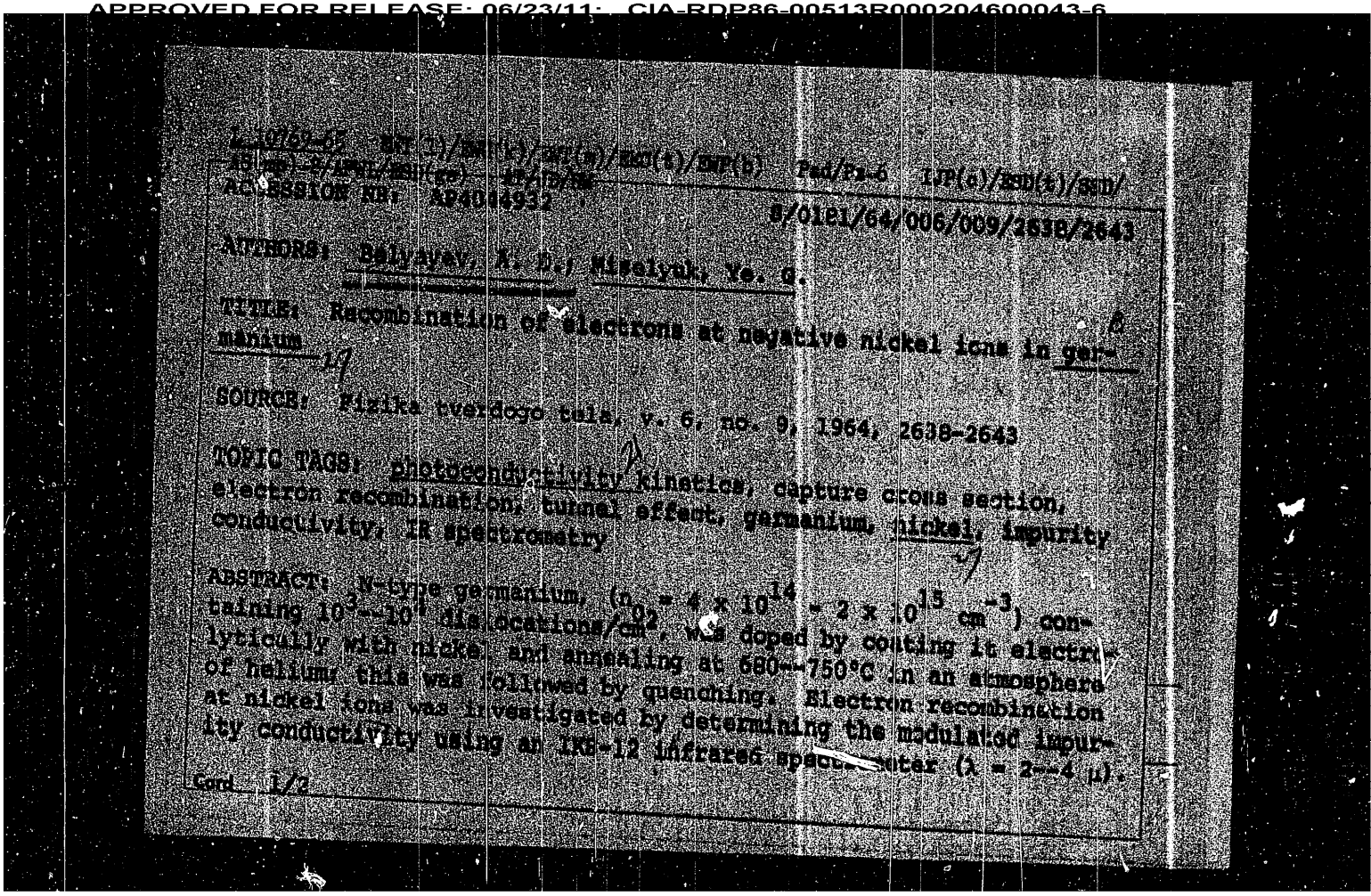
The effective cross section for electron capture σ_e^- by In^- ions was found to be 1×10^{-13} cm^2 at 100°K and did not vary greatly with temperature in the range 85--140°K. This may have been due to tunnel transitions through a Coulomb barrier. It was established that in n-type germanium crystals with or without nickel there were centers responsible for the slow component of the photoconductivity relaxation. These centers were of structural origin and they included edge dislocations. "The authors thank S. S. Malogolovets and A. I. Shiryayev for help with the experiments and K. D. Glinchuk for discussing the results." Orig. art. has: 4 figures.

ASSOCIATION: Institut poluprovodnikov AN USSR, Kiev (Institute of Semiconductors, AN UkrSSR)

SUBMITTED: 17Mar64 ENCL: 00

SUB CODE: EM, SS NR REF SOV: 010 OTHER: 007

Card 2/2



L 10762-65 EWT(l)/EWP(e)/EWT(m)/EWG(k)/EWP(b) Pad/Pz-6 IJP(c)/ESD(t)/ESD(gs)/
ACCESSION NR: AP4044932 S/0181/64/006/009/2638/2643

AUTHORS: Balyayev, A. P.; Miselyuk, Ye. G.

TITLE: Recombination of electrons at negative nickel ions in germanium

SOURCE: Fizika tverdogo tela, v. 6, no. 9, 1964, 2638-2643

TOPIC TAGS: photoconductivity kinetics, capture cross section, electron recombination, tunnel effect, germanium, nickel, impurity conductivity, IR spectrometry

ABSTRACT: N-type germanium, ($n_0 = 4 \times 10^{14} - 2 \times 10^{15}$ cm^{-3}) containing 10^2--10^4 dislocations/cm^2, was doped by cooling it electrolytically with nickel and annealing at 680--750°C in an atmosphere of helium; this was followed by quenching. Electron recombination at nickel ions was investigated by determining the modulated impurity conductivity using an IKS-12 infrared spectrometer (λ = 2--4 μ).

Card 1/2

ACCESSION NR: AP4041721

ASSOCIATION: Institut poluprovodnikov AN UkrSSR, Kiev (Institute of Semiconductors, AN UkrSSR)

SUBMITTED: 20Jun63 ENCL: 00

SUB CODE: SS NR REF SOV: 005 OTHER: 011

Card 3/3

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R000204600043-6

ACCESSION NR: AP4041721

effects. The principal results of the research were reported by the authors elsewhere (UFZh v. 8, 1179, 1963). The article describes the preparation of the specimens and the preliminary measurements, and relates how the presence of traps due to plastic deformation was demonstrated. It is shown that in addition to serving as the main traps with which the observed of long-time photoconductivity relaxation is associated, the dislocations act simultaneously as recombination centers. In deformed specimens they determine the lifetimes of electron-hole pairs. At considerable deformation, when the dislocation density exceeds 10^7 cm^{-2}, the capture of minority carriers (holes) is observed already at room temperature. It is concluded that the similarity between the capture phenomena in the deformed and initial specimens indicates that the traps have the same nature in both cases. "The authors thank Academician of AN UkrSSR V. Ye. Lashkarev, Ye. G. Miselyuk, and P. I. Baranskiy for interest and useful discussions." Orig. art. has: 5 figures and 6 formulas.

Card 2/3

ACCESSION NR: AP4041721 S/0181/64/006/007/2146/2154

AUTHORS: Figel'ski, T. R.; Belyayev, A. D.

TITLE: Capture of non-equilibrium carriers in plastically deformed germanium

SOURCE: Fizika tverdogo tela, v. 6, no. 7, 1964, 2146-2154

TOPIC TAGS: dislocation effect, crystal imperfection, plastic deformation, germanium, recombination

ABSTRACT: In order to establish whether structural defects, and particularly dislocations, can serve as traps for the capture of non-equilibrium holes at low temperatures, a systematic investigation was made of capture in n-Ge in which excess dislocations were produced by plastic deformation. The results indicate that the trap concentration increases with decreasing temperature. The dislocation traps are capable of causing nonlinear photoconductivity

Card 1/3

BELYAYEV, A.D. [Bieliaiev, A.D.]; FIGEL'SKI, T.R. [Fihel's'ki, T.R.]

Trapping centers of minority current carriers in plastically deformed germanium. Ukr. fiz. zhur. 8 no.10:1179-1181 O '63. (MIRA 17:1)

1. Institut poluprovodnikov AN UkrSSR, Kiyev.

S/058/62/000/006/071/136
A061/A101

increase makes the density of dislocations grow. High-temperature annealing reduces the number of dislocations dispersedly distributed among the boundaries of not-oriented blocks. An elimination of dislocations connected with the block boundaries takes place at higher temperatures. The increase of the density of dislocations in the specimen is accompanied by a decrease of the lifetime of minority carriers. The measurement of the position of energy levels created in Ge by dislocations yielded 0.20 - 0.15 ev, which fits values obtained earlier.

A. Shibanov

[Abstracter's note: Complete translation]

24.7500

39131
S/058/62/000/006/071/136
A061/A101

AUTHORS: Belyayev, A. D., Vasilevskaya, V. N., Miselyuk, Ye. G.

TITLE: The effect of some factors on the generation of dislocations in crystallization and their state in germanium single crystals

PERIODICAL: Referativnyy zhurnal, Fizika, no. 6, 1962, 20, abstract 6E166 ("In collection: "Rost kristallov. T. 3". Moscow, AN SSSR, 1961, 380 - 387. Discuss., 501 - 502)

TEXT: The effect of the density of dislocations in seeds, of impurities in concentrations surpassing the limits of solubility, and of the growth rate of Ge single crystals on the generation of dislocations in them has been investigated. It is shown that dislocations "germinate" from the seed into the bulk of the single crystal. Up to a concentration not surpassing the limits of solubility, impurities do not have effect upon the density of dislocations in the crystal. Above the limit of solubility, impurities sharply raise the number of dislocations. Up to a crystal pulling rate of 4 mm/min, the growth rate is not found to influence the generation of dislocations appreciably. A further rate

Card 1/2

30542

S/564/61/003/000/014/029
D207/D304

The effect of some...

4 most recent references to the English-language publications read as follows: G. Wertheim and G. Pearson, Phys. Rev., 107, 694, 1957; A. Kurtz, S. Kulin, B. Averbach, Phys. Rev., 101, 1285, 1956; J. Okada, J. Phys. Soc. Japan, 12, 1338, 1957; W. Tyler, W. Dash, J. Appl. Phys., 28, 1221, 1957.

Card 4/4

The effect of some...

HNO_3, 1 part CH_3COOH, 4 parts H_2O, and 8 mg I per 50 cm^3 of solution. Etch pits were counted under a metallurgical microscope МИМ-8(MIM-8). It was found that: (1) a high density of dislocations in a seed crystal produced an even higher density in a grown monocrystal; (2) Sb, Fe, Ag and Cd impurities increased dislocation densities in monocrystals and even produced polycrystalline structure if they were present in concentrations exceeding their limit of solubility in germanium; (3) many dislocations were produced if the rate of pulling was greater than 4 mm/min. because temperature gradients were greater at higher pulling rates; (4) annealing monocrystals reduced dislocation densities: in a sample with more than 10^4 dislocations per cm^2 a 50 - 60% reduction was obtained after 3 hours at 750°C and a 90% reduction after 1 hour at 900°C; (5) monocrystals with high dislocation densities had high resistivity and low nonequilibrium carrier lifetime; recombination levels due to dislocations had activation energies of 0.15 - 0.20 eV. Acknowledgment is made to A. N. Kvasnitskaya for preparing germanium samples. There are 4 figures, 1 table and 15 references: 4 Soviet-bloc and 11 non-Soviet-bloc. The

crystals. The purpose of the studies was to obtain germanium monocrystals with a more perfect structure. Monocrystals were grown by pulling from melt in vacuum. In each test special precautions were taken to keep the melt temperature, the rate of pulling, and the rate of rotation of the crucible and the seed crystal as constant as possible (the crucible and the seed were rotated in opposite directions). The rate of pulling was varied from 0.8 to 6 mm/min. Seed crystals contained dislocations with densities ranging from 10^2 to 10^7 cm^{-2}. The effect of impurities on formation of dislocations was studied using radioactive tracers Sb^{124}, Fe^{59}, Ag^{110}, Cd^{115}; in the experiments on the effect of impurities, seed crystals had low (10^2 - 10^3 cm^{-2}) dislocation densities. Heat treatment of as-grown monocrystals consisted of 1 - 3 hours heating in vacuum at temperatures greater than 700 - 800°C. Lifetimes of nonequilibrium carriers were measured as a function of dislocation density. Dislocation densities were found by 12 min. etching of ground and electropolished (100) and (111) faces in the following solutions: 2 parts HF, 2.5 parts

24.7500
10.9500

30542
S/564/61/003/000/014/029
E207/D304

AUTHORS: Belyayev, A. D., Vasilevskaya, V. N., and Miselyuk, Ye. G.

TITLE: The effect of some factors on formation of dislocations during crystallization and the state of dislocations in germanium monocrystals

SOURCE: Akademiya nauk SSSR Institut kristallografii. Rost kristallov, v. 3, 1961, 380-387

TEXT: The authors report how formation and density of dislocations in germanium monocrystals are affected by the presence and density of dislocations in a seed crystal, the presence of impurities in concentrations greater than their solubility limit, and by the rate of crystal growth. The authors investigated also the effect of subsequent heat treatment on the state of edge dislocations and the effect of dislocation densities from 10^3 to 10^7 cm^{-2} on the carrier lifetime in germanium mono-

Card 1/4

81770

Investigation of the Influence Exercised by Some Factors on the Occurrence of Dislocations in the Crystallization and Its States in Germanium Single Crystals

S/181/60/002/02/07/033
B006/B067

grinding with 7μ abrasive, chemical polishing with HF + HNO_3 (3:5); 45 sec at 70°C; slow etching with 2 parts of HF + 2.5 parts of HNO_3 + + 1 part of CH_3COOH + 4 parts of H_2O; 8 mg of iodine per 50 cm^3 were added to this solution (this etching agent proved to be most favorable). The results of the investigations are discussed in detail, and a number of microphotographs of the etch patterns are shown. The dislocation concentration in the seed influences the dislocation concentration in the single crystal in such a way that the higher the former, the higher is also the latter. The impurities had no essential influence on the occurrence of dislocations with concentrations below the solubility limit in Ge, at higher concentrations, however, an influence was noticed. Pulling rates < 4 mm/min influenced the dislocation concentration not essentially, whilst pulling rates above this value caused a considerable increase. Heating led to a reduction of the dislocation density (e.g., reduction by 50-60% at 750°C during three hours, by almost 90% at 900°C

Card 3/4

Investigation of the Influence Exercised by Some Factors on the Occurrence of Dislocations in the Crystallization and Its States in Germanium Single Crystals

S/181/60/002/02/07/033
B006/B067

bred single crystals. The seeds had uniform dimensions and shape: cubes with a cross section of ~ 0.2 cm^2. The influence exercised by the pulling rate on the occurrence of dislocations was investigated at rates between 0.8 and 6 mm/min, the effect of impurities by means of the active isotopes Sb^{124}, Fe^{59}, Ag^{110}, and Cd^{115}. For the purpose of influencing the state of the dislocations occurring in the single crystals, the single crystals were heated at 750-900°C for 1-3 hours in vacuo (this causes displacements of the dislocations which partly show approach and "recombination", partly repulsion, according to the angles formed by the Bürgers vectors of the interacting dislocations). The dependence of the lifetime of the non-equilibrium carriers on the dislocation density was measured by a photoelectric and an impulse method. Density, distribution, and displacement of the dislocations were investigated by etching, measuring the etching rate, and by taking etch patterns. The pictures were evaluated by means of a metallographic microscope of the type МИМ-8 (MIM-8). The samples were subjected to the following surface processing:

Card 2/4

81770

S/181/60/002/02/07/033
B006/B067

24.7500

AUTHORS: Belyayev, A. D., Vasilevskaya, V. N., Miselyuk, Ye. G.

TITLE: Investigation of the Influence Exercised by Some Factors on the Occurrence of Dislocations in the Crystallization and Its States in Germanium Single Crystals

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 2, pp. 227-234

TEXT: The authors investigated the influence exercised by the seed, the impurities, and the pulling rate on the occurrence of dislocations in germanium single crystals bred from melts. Furthermore, the effect of thermal processing on the state and distribution of dislocations in single crystals as well as the effect of the latter on the lifetime τ of the non-equilibrium carriers was investigated. The influenc exercised by the dislocation density in the seed crystals on the dislocation density in the bred single crystals was investigated for dislocation densities in the seeds between 10^2 and 10^7 cm^{-2}, where the seed crystals with dislocation densities of 10^4 cm^{-2} and more were cut out of specially

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BELYAYEV, A.D. [Bieliaiev, A.D.]; GLINCHUK, K.D. [Hlynchuk, K.D.]; MISELYUK, Ye.G. [Miseliuk, O.H.]

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